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Association between Lifestyle Modification and Side Effects of Antipsychotics Among Schizophrenia Patients

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Abstract

Background:schizophrenia is a chronic disease which has an impact on patient`s health and quality of life. This is occurred by negative symptoms of the disease, accompanied withpoor lifestyle, and under the side effects of antipsychotics, which varied from poor diet, low energy, increase weight to comorbid metabolic syndrome. Previous researchers had found a correlation between the impact of disease and medications on adherence to treatment, which in return worse the prognosis. The goal was to find out if modification of lifestyle among schizophrenia patients may affect the side effects of anti-psychotics, including metabolic syndrome or one of its criteria.

Methods: 36 patients had been selected randomly and underwent program of modifying lifestyle for 3 months and assessment of side effects of anti-psychotics by using Glascow anti-psychotics side effects scale (GASS) ,Morisky scale for assessment of adherence to treatment and Health Promoting Lifestyle Profile II(HPLPII) scalefor quality of life.

Results: patients with schizophrenia had shown after applying lifestyle modification program a significant improvement in all dimension of HPLP II scale from the first month except for health responsibility, Spiritual growth and Interpersonal relations subscales which started to show significant improvement from the second month, with high significant increase in morisky score after 3 months of life style modification and improvement in total GASS scale after the second months of commitment of lifestyle modification with significant improvement in all dimension except for cardiovascular and diabetes.

Conclusion: When patients underwent lifestyle modification, there was a significant improvement appeared on GASS Scale results, that showed decrease in side effects of antipsychotic. Meanwhile, morisky scale showed significant improvement in rate

of adherence to the treatment at the end of study and in HPLPII scale results indicated to have better quality of life.
key words: lifestyle modification, schizophrenia, side effects.

Introduction

Schizophrenia has been known to have impact on certain ways on patient`s life that appeared in form of impaired cognition, functionality, affected one`s social life and health in form of(heavy smoking, low level of physical activity, poor diet (high consumption of sugar, diet rich in high saturated fats and poor in unsaturated fats is associated with obesity, increased concentration of low-density lipoprotein(LDL) cholesterol and insulin resistance). This is happened either by the disease`s symptoms (delusions,hallucinations and negative symptoms) or by side effects of drugs that interfere with daily life of the patients and may increase rates of non-adherence to medication and increase rate of hospitalization and may worse the condition more ***(Dipasquale et al., 2013)***.Meanwhile , researches has found that there are factors that may affect adherence to treatment and if worked on those factors this may decrease or may be solve the problems like lack of awareness ,side effects of drugs which this part was focused on finding ways to improve adherence by the patients.***(Haddad et al.,2014)***.**Aim:**was to find out the association between lifestyle modification and quality of life.

Methods:

Thirty six patients were collectedfrom the inpatients of abbassia mental health hospital ,that were selected randomly based on inclusion criteria as: age between 18 and 60, bothsexes were accepted, diagnosed with schizophrenia according to diagnostic and statistical manual of mental disorders DSM5 and under adult care giver. At first patients underwent several investigations to rule out who had received a psychiatric diagnosis other than schizophrenia,those who had during the screening evidence of liver or renal dysfunction, sever cardio vascular disease CVD causing dysfunction, or diabetes mellitus DM complications; or had conditions that limited their ability to perform the lifestyle modifications, such as arthritis, pulmonary disease, or neurological or dietary restrictions, female patients who are pregnant or lactating and who have previous history of substance use in one-year prior to the study. The investigation included ECG, thyroidfunction test, Liver function test (ALT, AST, serum albumin, total bilirubin), kidney function tests (urea & creatinine) and CBC. Screening for MetS was done accordingto International Diabetes Federation(IDF). To diagnose patients with MetS; they must have: Central obesity (defined as waist circumference* with ethnicity specific values), plus, any two of the following four factors:table 1

Risk factor	Defining level
Abnormal blood pressure	(≥130/≥85) or diagnosed as hypertensive
Triglyceride level	≥ 150 mg/dL (1.7 mmol/L)

	or specific treatment for this lipid abnormality	
Lower HDL	**male**	< 40 mg/dl
	female	< 50 mg/dl
Fasting blood glucose level	≥ 100 mg/dl or diagnosed as DM If above 5.6 mmol/L or 100 mg/dL,Oral glucose tolerance test (OGTT) is strongly recommended but is not necessary to define presence of the syndrome.	
Abnormal waist circumference (Abdominal obesity)	**male**	≥ 90 cm
	female	≥80 cm

If BMI is > 30kg/m², central obesity can be assumed, and waist circumference does not need to be measured***(Kubrusly et al., 2015)***.

We then before starting the program,measured severity of side effects of the drug, their anthropometric measures as weight, height, lipid profile, blood glucose level, waist circumference, assessment quality of life by using Health Promoting Lifestyle Profile scale II (HPLP II scale and assessment adherence to treatment using Morisky scale.

Patients underwent pharmacological intervention;Appropriate antipsychotics were prescribed according to each patient's condition as regard attitudes, behaviors, comorbidities, severity of signs and symptoms, demographic and environmental factors, and the cognitive functioning of patients ***(García et al., 2016)***.Used doses were calculated to be haloperidol equivalent dose as we used olanzapine 10 mg, aripiprazole 20 mg, haloperidol 10 mg, risperidone 4 mg and Quetiapine 400 mg ***(Leucht et al., 2014)***.Doses of antipsychotics were fixed after taking consent from patient and their care givers during period of three months under monitoring (respiredone 4mg/day, olanzapine 10-15 mg/day, aripiprazole 5- 15 mg/day, Haloperidol 5-10mg/day, quetiapine 100-200 mg/day (as sedative), benztropine 2-3 mg/day and haloperidol depot 50mg twice/month).

The medication adherence was assessed by Morisky Scale ***(Castellucci et al., 2015)***.

Lifestyle intervention included several programs aimed to improve quality of life and adherence to treatment and impact on side effects of drug. This involved psychoeducation program about the disease (causes, medication, side effect) and an education about the whole process. This was done in 9 sessions each one 30-45 min offered by psychiatrist, psychologist, nutritionist and physical training. Thedietary programincluded individualizedwell-balanced diet plan for each patient was done by the clinical nutritionist according to patient's measurements, physical health and acceptance. Each diet plan was suitable to each patient according to their conditions, daily follow up of the diet was done by nurses and care givers. We assessed their dietary intake by using 24-Hour Dietary call. The main principles of the program were to Keep the caloric intake within normal requirements according to each patient

(weight, age and activity). To get plenty of fruit and vegetables in diet.The main constitution of each meal is starchy foods such as potatoes, pasta or rice and try to go for options that were higher in fiber such as brown rice or potatoes.Eating more fiberand recommended at least 18-30 grams of fiber each day. Eating more fish and trying to eat at least three portions of oily fish each week. Cutting down on saturated fats, sugar and salt. Drinking enough to keep your body well hydrated. the aim was to drink about 1.2 liters each day but in hot weather or if patients were exercising a lot they need more. Water, milk and fruit juice were the healthiest things to drink. Tea, coffee and energy drinks contain caffeine which was a stimulant and should be taken in moderation one cup/day.

The exercise program was designed to be suitable according each`s age, weight,(BMI) body mass index. The intensity of exercise was adjusted upon maximum heart rate(220-age) and duration was 2.5 hours per week as 30 -40 every time, the goal was to be 5 day per week. Each aerobic exercise session included 5 min of walking for a warm-up, followed by 30 min of aerobic exercise, then finally a 5-min cool-down period, i.e., 40 min in total. To ensure that participants were exercising safely at their target intensity, heart rate monitors were used to monitor exercise intensity throughout the 12-week training program under one-to-one supervision ***(Wang et al., 2018).***

Statistical Analysis

All data were analyzed using SPSS 20.0 for windows (SPSS Inc, Chicago, IT, USA) and MedCalc 13 for windows (MedCalc Software bvba, Ostend, Belgium). Continuous variables were expressed as the mean ± SD & median (range), and the categorical variables were expressed as a number(percentage).

Continuous variables were checked for normality by using Shapiro-Wilk test. Independent sample Student's t-test was used to compare two groups of normally distributed data while Mann Whitney U test was used for non-normally distributed data. One-way ANOVA test was used to compare more than two measurements of non-normally distributed data.

All tests were two sided. $P < 0.05$ was considered statistically significant (S), $p < 0.01$ was considered highly statistically significant (HS), and $p \geq 0.05$ was considered non-statistically significant (NS).

Results

Table (2) Prevalence of metabolic syndrome (MetS) in schizophrenia at the beginning of the study and after 3 months.

	At beginning (N=36)		**After 3 months (N=36)**	
	No	**%**	**No**	**%**
MetS	9	25	6	16.67
No MetS	27	75	30	83.33

Table (3) Distribution of components of metabolic syndrome (MetS) in schizophrenia patients at the beginning of the study

	No	%
Abnormal blood pressure (≥130/≥85) or diagnosed as hypertensive	12	33.33
Triglyceride level ≥ 150 mg or on lipid lowering agent	6	16.67
Lower HDL (< 40 mg/dl male, < 50 mg/dl female)	6	16.67
Fasting blood glucose level ≥ 100 mg/dl or diagnosed as diabetes mellitus	5	13.89
Central obesity (≥ 94 cm for males and ≥80 cm for females)	24	66.67

Table (4) Changes in anthropometric measures and blood pressure throughout the study

At beginning (N=36)	**After 1 month (N=36)**	**After 2 months (N=36)**	**After 3 months (N=36)**	**Test***	**p-value (Sig.)**
Mean ± SD Median (Range)	**Mean ± SD Median (Range)**	**Mean ± SD Median (Range)**	**Mean ± SD Median (Range)**		
Weight (kg)					
89.42 ± 21.65 90 (54-130)	88.53 ± 20.18 89 (55-128)	86.75 ± 19.01 87 (56-126)	84.47 ± 17.28 85 (58-122)	0.45	0.72 (NS)
BMI (kg/m^2)					
35.99 ± 7.41 29.4 (20-44)	33.68 ± 6.77 32.1 (21-42)	30.02 ± 6.09 29.4 (21.7-40)	29.24 ± 5.468 28.7 (22.7-39.1)	1.02	0.049 (Sig.)
Waist circumference (cm)					
116.75 ± 15.02 98.4 (65-136)	103.24 ± 12.95 95 (66-120)	88.69 ± 11.92 89 (65-117)	82.67 ± 10.85 85 (66-112)	1.94	0.037 (Sig.)
Systolic blood pressure (mmHg)					
149 ± 14.44 140 (125-160)	139.06 ± 12.55 140 (120-150)	134.86 ± 10.52 130 (110-140)	122.11 ± 6.36 120 (120-130)	1.55	0.047 (Sig.)
Diastolic blood pressure (mmHg)					
92.08 ± 11.24 90 (80-95)	87.01 ± 10.15 85 (70-95)	81.67 ± 9.21 80 (70-95)	84.31 ± 4.19 75 (65-90)	2.39	0.019 (Sig.)

Table 5: Comparison of the lipid profile in the studied subjects throughout the study

At beginning (N=36)	After 1 month (N=36)	After 2 months (N=36)	After 3 months (N=36)	Test*	P-value (Sig.)
Mean ± SD **Median (Range)**	**Mean ± SD** **Median (Range)**	**Mean ± SD** **Median (Range)**	**Mean ± SD** **Median (Range)**		
Triglyceride (Normal < 150 mg/ dl)					
161.8 ± 40.1 158 (120-210)	158.46 ± 31.69 122 (115-185)	141.85 ± 30.88 130 (109 -176)	130.62 ± 27.16 140 (89-160)	0.75	0.04 (Sig.)
Cholesterol (Normal < 200 mg/dl)					
234.1 ± 53.9 189 (120-290)	215.2 ± 45.2 166 (120-260)	186.4 ± 43 155 (98-245)	163.8 ± 39 164 (100-210)	0.81	0.035 (Sig.)
LDL (Normal< 130 mg/dl)					
135.77 ± 23.1 121 (110-160)	129.54 ± 21.4 112 (79-146)	118 ± 19.01 113 (82-140)	113.23 ± 15.64 109 (80-130)	0.89	0.025 (Sig.)
HDL (Normal > 40mg/dl)					
23.15 ± 15.74 290 (20-40)	28.23 ± 15.67 32 (22-48)	32.54 ± 13.58 33 (29-53)	43.08 ± 13.9 45 (30-69)	0.75	0.04 (Sig.)
Fasting blood glucose (Normal < 100 mg/dl)					
130.08 ± 25.68 123 (98-180)	124.45 ± 19.02 128 (113-145)	122.92 ± 27.15 119 (97-156)	117.25 ± 13.41 115 (109-138)	0.94	0.012 (Sig.)

**P < 0.05 significant (S), p < 0.01 highly significant (HS),p ≥ 0.05 non-statistically significant (NS).

Table 6: Morisky adherence

Morisky adherence	At beginning (N=36)	After 3 months (N=36)	Test*	P-value (Sig.)
Mean ± SD Median (Range)	1.15 ± 0.89 1 (0-3)	3.385 ± 0.768 4 (2-4)	6.8	<0.001 (HS)

* Student T test*P < 0.05 significant (S), p < 0.01 highly significant (HS),p ≥ 0.05 non-statistically significant (NS).

Table 7: Health Promoting Lifestyle Profile II (HPLP II**)** of all patients throughout the 3 months study period

At beginning (N=36)	After 1 month (N=36)	After 2 months (N=36)	After 3 months (N=36)	Test*	P-value (Sig.)
Mean ± SD **Median**	**Mean ± SD** **Median**	**Mean ± SD** **Median**	**Mean ± SD** **Median**		

(Range)	(Range)	(Range)	(Range)		
Health Promoting Lifestyle Profile scale II (Total score)					
72.31 ± 17.8 69 (54-125)	91.85 ± 17.56 92 (66-127)	108.23 ± 15.24 106 (82-135)	127.85 ± 15.8 127 (101-154)	□ 2.82 ♦ 5.54 ● 8.41	□ 0.01 (Sig.) ♦ <0.001 (HS) ● <0.001(HS)
Subscales					
Health responsibility					
14.31 ± 3.95 16 (9-18)	16.31 ± 4.17 17 (11-21)	18.23 ± 3.29 19 (13-22)	20.49 ± 3.31 22 (16-25)	□ 1.26 ♦ 2.75 ● 4.58	□ 0.22 (NS) ♦ 0.011 (Sig.) ● <0.001 (HS)
Physical activity					
11.46 ± 4.58 9 (8-24)	16 ± 4.38 17 (11-25)	18.46 ± 4.25 18 (14-27)	22.54 ± 5.25 24 (16-30)	□ 2.58 ♦ 4.04 ● 5.73	□ 0.017 (Sig.) ♦ 0.001 (Sig.) ● <0.001 (HS)
Stress management					
10.62 ± 2.33 10 (9-17)	13.46 ± 2.75 13 (10-18)	16.385 ± 2.725 18 (13-19)	18.46 ± 2.537 19 (15-22)	□ 2.48 ♦ 5.8 ● 8.21	□ 0.009 (Sig.) ♦ <0.001 (HS) ● <0.001 (HS)
Nutrition					
12.15 ± 4.95 9 (9-25)	16.77 ± 4.82 18 (10-25)	21 ± 4.78 22 (14-27)	24 ± 3.63 24 (18-29)	□ 2.41 ♦ 4.64 ● 6.96	□ 0.024 (Sig.) ♦ <0.001 (HS) ● <0.001 (HS)
Spiritual growth					
10.77 ± 4.11 10 (8-4)	13.54 ± 3.21 13 (10-22)	16.46 ± 3.38 17 (12-25)	20.62 ± 3.51 20 (15-28)	□ 1.92 ♦ 3.86 ● 6.58	□ 0.068 (NS) ♦ 0.001 (Sig.) ● <0.001 (HS)
Interpersonal relations					
13 ± 3.48 12 (9-22)	15.15 ± 3.078 15 (11-22)	17.76 ± 2.45 18 (14-22)	21.39 ± 3.15 21 (18-28)	□ 1.67	□ 0.109 (NS) ♦ 0.001 (Sig.)

♦ 4.03 ● <0.001 (HS)
●
6.43

***** Student T test After 1-month vs at beginning
♦ After 2 months vs at beginning ●After 3 months vs at beginning
*P < 0.05 significant (S), p < 0.01 highly significant (HS),p ≥ 0.05 non-statistically significant (NS).

Table 8: Glasgow Antipsychotic Side-effect Scale (GASS)

At beginning (N=36)	After 1 month (N=36)	After 2 months (N=36)	After 3 months (N=36)	Test	P-value (Sig.)
Mean ± SD Median (Range)	**Mean ± SD Median (Range)**	**Mean ± SD Median (Range)**	**Mean ± SD Median (Range)**		
GASS (Total score)					
17.4 ± 6.6 20 (7-25)	14.5 ± 4.97 15 (6-22)	12 ± 4.71 12.5 (4-20)	9.4 ± 3.95 9.5 (4-16)	□ 1.11* ♦ 2.35* ● 3.71*	□ 0.248 (NS) ♦ 0.029 (Sig.) ● 0.002 (Sig.)
Subscales					
Weight gain					
1.62 ± 1.56 3 (0-3)	0.46 ± 1.13 0 (0-3)	0.00	0.00	8.19 ¶	<0.001 (HS)
Prolactinaemic side effects					
4.15 ± 2.38 4 (0-9)	3.23 ± 2.05 3 (0-8)	1.69 ± 1.6 1 (0-5)	1.54 ± 1.33 1 (0-3)	5.81¶	0.002 (Sig.)
Screening for DM					
1.15 ± 1.73 0 (0-5)	0.69 ± 1.11 0 (0-3)	0.62 ± 0.96 0 (0-2)	0.077 ± 0.278 0 (0-1)	1.95¶	0.135 (NS)
Genitourinary side effects					
2.78 ± 0.03 2 (1-3)	2.45 ± 0.15 (2-3)	1.73 ± 0.26 (1-2)	0.64 ± 0.23 0 (0-1)	3.12¶	0.025 (Sig.)
Gastro-intestinal side effects					
0.62 ± 1.04 0 (0-3)	0.08 ± 0.27 0 (0-1)	0.00	0.00	3.93¶	0.014 (Sig.)
Anticholinergic side effects					
4.23 ± 1.42 4 (2-6)	3.46 ± 1.27 3 (2-5)	2.23 ± 0.6 2 (1-3)	1 ± 0.71 1 (0-2)	23.29¶	<0.001 (HS)
Extra-pyramidal side effects					
5.85 ± 2.15 6 (2-9)	4.31 ± 1.65 4 (2-7)	3.31 ± 1.25 3 (2-5)	1.85 ± 0.8 2 (1-3)	15.39¶	<0.001 (HS)
Cardiovascular side effects					

1.08 ± 1.32 1(0-4)	0.85 ± 1.41 0 (0-4)	0.54 ± 0.97 0 (0-3)	0.23 ± 0.6 0 (0-2)	1.41¶	0.252 (NS)
Sedation & CNS side effects					
5.08 ± 1.12 6 (3-6)	3.77 ± 0.83 4 (2-5)	2.69 ± 0.63 3 (2-4)	1.62 ± 0.96 2 (0-3)	35.05¶	<0.001 (HS)

***** Student T test ¶ One-way ANOVA test □ After 1-month vs at beginning
♦ After 2 months vs at beginning ●After 3 months vs at beginning
*P < 0.05 significant (S), p < 0.01 highly significant (HS), p ≥ 0.05 non-statistically significant (NS).

Table (2) show that 25% of patients were found to have metabolic syndrome at the beginning of the study and after 3 months of commitment to the program of lifestyle modification they decreased to 16.67%.Table (3)shows that abnormal waist circumference was the most common component of metabolic syndrome with 66.67% of patients had abnormal abdominal circumference.

Table (4) shows significant difference between the studied subjects as regard BMI, waist circumference and Blood Pressure.
Table (5) shows that significant change in the lipid profile and blood glucose levels among our patients throughout the three months.

Table (6) shows high significant increase in morisky score after 3 months of lifestyle modification.

Table (7) shows significant improvement in all dimension of HPLP II scale from the first month except for health responsibility, Spiritual growth and Interpersonal relations which started to show significant improvement from the second month.

Table (8) shows that patients started to show significant improvement in total GASS scale after the second months of commitment of lifestyle modification with significant improvement in all dimension except for cardiovascular and screening for diabetes.

Discussion

schizophrenia has been found to have impact on mental, physical and social health (Lysaker ***et al., 2014)***. This is occurred as the disease has showed to affect behavior as decrease physical activity, tendency to isolation and change in eating behavior as; increase intake of food (junk food and fat) and increase consumption of sugar. Schizophrenia patients tend to increase consumption of cigarettes and caffeine. All of that, Increased risk of occurrence of comorbid diseases as (hypertension, DM and MetS) ***(Henderson et al., 2015)***.

The goal was to find out if modification of lifestyle among schizophrenia patients may affect the side effects of anti-psychotics including metabolic syndrome or one of its criteria,and in return affect the adherence to treatment.

Our findings were based on ***Heald et al., 2017*** study which stated that the high prevalence of poor diet, inadequate exercise and obesity among patients with schizophrenia may interfere with severity of symptoms At the beginning of the study, nine patients (25%) were categorized as having MetS using the International Diabetes Federation(IDF) Criteria.

33.33% of patients suffered high blood pressure, 16.67% had high levels of TG, 16.67% showed low levels of HDL, 13.89% had high blood glucose level and 66.67% had increased waist circumference.

In agreement with ***Gill et al., 2016***, that found significant improvements in MetS risk factors, physical strength, and flexibility. The study used multidisciplinary intervention over eight weeks to increase health-promoting behaviors and reduce the negative effects of MetS disorders among persons with serious mental illnesses and that showed by significant reduction in blood pressure and waist circumference, although may be below normal for respective ages, but no reduction in diabetes or readiness to smoke cessation due to short period of time and because they relayed on glycosylated hemoglobin (HbA1c) changes, while our study was relied on fasting blood glucose.

In each evaluation through the study, patients were evaluated according to components of metabolic syndrome. Our results showed no significant changes in weight over 3 months, but there was significant decrease in mean BMI after 3 months with $P = 0.049$. Mean waist circumference showed significant reduction after 3 months with $P = 0.039$. Blood pressure also significantly improved over the study as mean systolic blood pressure decreased with $P = 0.047$ and mean diastolic with $P = 0.019$, also there wassignificant change in the lipid profile and blood glucose levels among our patients throughout the three months.

A positive impact on weight, BMI and blood glucose measurements, thus indicating the effectiveness of combining diet and exercise. After 12 months, participants with type II diabetes and severe mental illness in ***Lindenmayer et al.2009*** trial, BMI was reduced. Furthermore, blood glucose also decreased significantly ($P < 0.001$). This reduction was significantly related to the nutrition module that was completed during the beginning of the intervention. Similarly, all of ***Teachout et al.2011*** participants reduced their weight and 40% of fasting glucose levels.

Also, ***Gurusamy et al., 2018*** and ***Yarborough et al., 2013*** results showed that lifestyle interventions including (Psychoeducation, dietary modification and physical activity) were safe and effective for improving lipid profile.

Assessment of effects of lifestyle modification using HPLP II in 3 months duration showed significant improvement in all dimension of HPLP II scale from the first month except for health responsibility, Spiritual growth and Interpersonal relations which started to show significant improvement from the second month (table 7).

Shih-Pi et al., 2018 study used HPLP II in assessment quality of life and showing significant difference in psychological health and social relationships. These positive factors enhance the self-confidence of patients and provide stable support. Also, there was a significant improvement in nutrition part and physical health **(*Shih-Pi et al., 2018)***.

Also, our findings agreed with ***Happell et al., 2012***, which was a systemic review on health behavior interventions to improve physical health in individuals diagnosed with a mental illness. It was found that most of the included studies reported improvements in health behaviors following interventions. These interventions were on physical health and health behaviors, such as body weight, physical activity, nutrition, alcohol use, and smoking. The findings provide evidence for the positive effect of health behavior interventions in improving the physical health of individuals diagnosed with a serious mental illness.

Non-adherence is a major problem in the treatment of schizophrenia. Its high prevalence, potentially severe consequences and associated costs make the study of this phenomenon a priority

A qualitative study from rural Ethiopia explored the reasons for non-adherence to antipsychotic medications in people with schizophrenia .Many of the factors associated with non-adherence include inadequate availability of food, lack of family/social support, lack of insight, failure to improve with treatment, medication side effects, substance abuse, stigma and dissatisfaction with the attitude of health care providers ***(Teferra et al., 2013)***.which our study worked to decrease the factors and enhance the adherence .this appeared by using moriskyscale .

In our study, we used GASS as a tool to assess the side effects of antipsychotic medication on schizophrenia patients before, after and throughout the study to identify if lifestyle modification had effect on side effects of antipsychotics or not. Our patients showed that they started to show significant improvement in GASS total score after the second month of commitment of lifestyle modification ($p= 0.029$). Except from screening for DM and cardiovascular side effects, patients showed significant improvements in all other scale dimensions and this may be short period of study to improve in diseases although parameters shoeing significant improvement.

Our patients showed change in the degree of side effects that they experienced over three months. After two months of lifestyle intervention, improvement started to occur that number of patients who suffered from moderate side effects decreased from 25 patients to 6 patients at the end of the study, who were turned to the mild symptoms group.

From our observation during the study, despite the difficulties in implementation close lifestyle intervention for our patients, it was promising that small decreases of body weight and BMI in this population were possible. It appeared that health promotion interventions targeting physical exercise and eating habits in patients with schizophrenia might be useful for prevention of weight gain. Furthermore, patients with schizophrenia usually want to learn more about healthy lifestyles and background theories of lifestyle interventions

This was compatible with ***McDevitt et al., 2006*** study of perceptions of barriers to and benefits of physical activity among patients with severe mental disease, participants saw exercise as positive and desirable, with benefits for both physical and mental health. This suggested that patients with severe mental disease are prepared to participate in health promotion interventions.

But ***Holt et al., 2018*** were having different findings. After applying the same Structured lifestyle education for allparticipants with Schizophrenia, 414 patients divided into two groups over 12 months. The results were not promising as, weight changes did not differ between both groups, either physical activity or nutrition. Glycated hemoglobin (HbA1c), fasting glucose and lipid profile remained unchanged by the intervention. Quality of life, psychiatric symptoms and illness perception did not change during the trial. However, this intervention did not meet each patient's needs despite presence an interest among patients to improve quality of life.

Such findings support the integration of health promotion interventions targeting physical activity and eating habits into mental health care, whereby patients should be motivated to follow this type of intervention. When health promotion becomes a part of daily care, mental health professionals could play an important role in motivating their patients to participate. According to patients' perceptions, mental health professionals can provide support, motivation, and structure and feel comfortable with this support

CONCLUSION

When patients underwent lifestyle modification, there was a significant improvement appeared on GASS Scale results, that showed decrease in side effects of antipsychotic. Meanwhile, morisky scale showed significant improvement in rate of adherence to the treatment at the end of study and in HPLPII scale results indicated to have better quality of life.

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