The association between psychiatric disorders and general medical conditions

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Background
The study of the relation between general medical conditions (GMC) and psychiatric disorders is of great importance. Many psychiatric patients have symptoms of GMC, and several patients with medical disorders experienced psychiatric symptoms. The overlapping of psychiatric and medical symptoms could affect the diagnosis and choice of appropriate treatment plan.

Objective
To explore the relation between GMC and psychiatric disorders in outpatient psychiatric clinic.

Patients and methods
Psychiatric patients were recruited from the attendees of psychiatric outpatient clinic in Minia University Hospital. Participants were interviewed based on Structured Clinical Interview for DSM-5. Anthropometric measurements and laboratory investigations were done to diagnose the associated GMC.

Results
The mean age of our patients was 32.8±14.1 years, and 41% of the studied patients had at least one comorbid GMC. The most prevalent was overweight (41%) and the least was diabetes mellitus (15.7%). A significant association was found between comorbid GMC and low socioeconomic status (P<0.024) and sedentary lifestyle (P<0.001). Obesity and ischemic heart disease were significantly associated with psychiatric disorders (P<0.001).

Conclusion
Psychiatric outpatients of Minia University Hospital have high rates of comorbid GMC. Medical assessments of patients with psychiatric disorders yield important medical prognostic information

Keywords:
comorbid, general medical conditions, outpatients

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Introduction

The rapid development of medical study in Egypt leads to the fact that medical practice becomes more specialized. So much information about diseases has made physicians to focus on one disease without considering the possibility of comorbid diseases. The correct practice of medicine is to think in an integrative, not compartmental way. High incidence of medical comorbidity and increased rates of mortality among people with psychiatric disabilities cannot be ignored. Patients with psychiatric disorders are at higher risk of premature death than the controls [1]. Rates of cardiovascular diseases and metabolic conditions including diabetes, obesity, and hyperlipidemia are found to be consistently elevated in individuals with psychiatric illness [2,3]. Among individuals with schizophrenia, suicide and injury accounted for 30–40% of early deaths, but 60% of early mortality was owing to the so-called 'natural causes,' including cardiovascular disease, diabetes, respiratory diseases, and infectious diseases. In this group, individuals die from cardiovascular disease at more than double the rate of the general population and about triple the rate for diabetes, respiratory diseases, and infectious diseases [4]. The high incidence of medical and psychiatric comorbidity is a complex process. There are some contributing factors that increase the risk of comorbidity. Some of these factors are lifestyle [5], access to medical care, quality of medical care [6], and biological mechanisms [7]. There are promising research studies which suggested that there may be a common pathophysiological process between psychiatric disorders and comorbid medical disorders (Oosthuizen *et al.*, 2008). [8] Therefore, we performed a cross-sectional case–control study to investigate the relation between general medical conditions (GMC) and psychiatric disorders in psychiatric outpatient clinic.

Patients and methods

Participants

The study included 83 psychiatric patients who presented to outpatient clinic of psychiatry at Minia University Hospital from first of May 2019 to end of October 2019. They were assessed for current psychiatric and general medical disorders. In our study, we adopted a broad definition of comorbidity, such as co-occurrence of mental and medical conditions in the same patients, regardless of the chronological order [9].

Inclusion criteria were (a) patients aged more than or equal to 18 years but less than or equal to 70 years; (b) patients of either sex, and (c) patients who agreed to participate in the study and undergo the required measurements and laboratory investigations. Exclusion criteria were (a) psychiatric disorders owing to psychoactive substance use and (b) patients with emergency psychiatric conditions. A total of 97 psychiatric patients visited the psychiatric outpatient clinic during the studied period, but 14 patients dropped out. The remaining 83 patients completed the study. Participants were interviewed by a trained psychiatrist based on Structured Clinical Interview for DSM-5. Demographic data, duration of illness, and medication history were obtained during the interview. Moreover, 100 healthy controls were selected from medical, paramedical, and employee staff of Minia University Hospital and matched with the psychiatric patients in terms of age, sex, and residency and included in the current study. They were assessed by an experienced internist physician for medical conditions and had no current or history of psychiatric disorders based on short psychiatric interview.

Procedures

Medical assessments

Full medical history was taken by a trained medical physician. Careful clinical examination was done, with special emphasis on the following: (a) BMI; (b) waist/hip ratio; (c) blood pressure measurement; (d) diagnosis of ischemic heart disease was established by ECG and echocardiography; (e) diagnosis of diabetes mellitus by measuring fasting glucose level, 2-h plasma glucose level, and HbA1c level; and (f) assessment of dyslipidemia was done by measuring plasma cholesterol and triglyceride levels.

Ethical approval

The study was approved and monitored by the Research Ethics Committee, Minia Faculty of Medicine. IRB# 207:4/2019. The investigators explained the steps and value of the research to all eligible participants. Those who agreed to be included in the study signed a fully informed consent form.

Statistical analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 22.0 for Windows (IBM Co., Armonk, New York, USA). Quantitative data were presented as mean and SD, whereas qualitative data as frequency distribution. Comparisons of sociodemographic and clinical variables between groups were performed using the c^2 test and independent sample t test. Odds ratios (OR) between cases and controls were calculated using logistic regression models.

Results

Based on the overall sample, participants' sociodemographic characteristics are shown in Table 1. There were no statistically significant differences between patients with psychiatric disorders and individuals in control group except for socioeconomic status ($P < 0.024$) and sedentary lifestyle ($P < 0.001$). Overall, 41% of the psychiatric patients had at least one comorbid GMC. The most common was overweight (41%) (Table 2). Obesity and ischemic heart disease were more prevalent in patients with psychiatric disorders than individuals in control group ($P < 0.001$) (Table 2). Patients with depression were significantly overweight ($P < 0.045$) and obese ($P < 0.048$) (Tables 3 and 4). However, patients with schizophrenia had significant diabetes mellitus ($P < 0.040$) (Table 5).

On the contrary, a simple logistic regression analysis showed that low socioeconomic state [OR: 2.275, 95% confidence interval (CI): 1.075–4.814, $P < 0.032$), sedentary lifestyle (OR: 4.34, 95% CI: 2.156–8.739, $P < 0.001$), obesity (OR: 3.378, 95% CI: 1.667–6.847, $P < 0.001$), and ischemic heart disease (OR: 4.113, 95% CI: 1.788–9.463, $P < 0.001$) could predict the presence of comorbid psychiatric disorders in patients with GMC (Table 6). Furthermore, these findings were proved by the multiple logistic regression analysis for sedentary lifestyle [adjusted odds ratio (AOR): 7.84, 95% CI: 3.53–17.412, $P < 0.001$), obesity (AOR: 3.323, 95% CI: 1.367–8.073, $P < 0.008$), and ischemic heart disease (AOR: 3.651, 95% CI: 1.37–9.727, $P < 0.010$) (Table 7) and supported by multiple stepwise logistic regression, which indicate that the sedentary lifestyle (AOR: 7.296, 95% CI: 3.368–15.804, $P < 0.001$), obesity (AOR: 3.232, 95% CI: 1.406–7.427, $P < 0.006$), and ischemic heart disease (AOR: 4.166, 95% CI: 1.605–10.818, $P < 0.003$) were the most

Table 1 Sociodemographic characteristics in psychiatric patients and control groups

	Control group (*n*=100)	Psychiatric patients group (*n*=83)	*P*
Age			
Range	(18-68)	(18-70)	
Mean±SD	32.1±14.2	32.8±14.1	0.791
Median IQR	31 (20-50)	31 (20-50)	
Sex [n (%)]			
Male	47 (47)	37 (44.6)	0.743
Female	53 (53)	46 (55.4)	
Marital status [*n* (%)]			
Single	48 (48)	40 (48.2)	0.922
Marred	42 (42)	37 (44.6)	
Divorced	7 (7)	4 (4.8)	
Widow	3 (3)	2 (2.4)	
Occupation [*n* (%)]			
Employer	54 (54)	41 (49.4)	0.535
Unemployed	46 (46)	42 (50.6)	
Residence [*n* (%)]			
Urban	47 (47)	39 (47)	0.999
Rural	53 (53)	44 (53)	
Education [*n* (%)]			
Illiterate	47 (47)	43 (51.8)	0.517
Educated	53 (53)	40 (48.2)	
Socioeconomic [*n* (%)]			
Low	33 (33)	44 (53)	<0.024*
Middle	38 (38)	22 (26.5)	
High	29 (29)	17 (20.5)	
Smoking [*n* (%)]			
Smoker	34 (34)	33 (39.8)	0.421
Non	66 (66)	50 (60.2)	
Sedentary lifestyle [*n* (%)]			
Present	15 (15)	36 (43.4)	<0.001*
Absent	85 (85)	47 (56.6)	
Family history [*n* (%)]			
Positive	6 (6)	9 (10.8)	0.234
Negative	94 (94)	74 (89.2)	

*Significant level at *P* value less than 0.05.

predictors of comorbid psychiatric disorders in patients with GMC (Table 8).

Discussion

In the present study, near half (41%) of the patients with psychiatric disorders presented at least with one comorbid GMC. This finding is in line with the National Comorbidity Survey Replication, which revealed that 68% of adults with mental disorders have at least one general medical disorder [10]. Moreover, Kessler *et al.*[11] reported that ~ 25% of adults in the United States have at least one mental disorder in their life, and approximately half of them experience at least one comorbid GMC. Our results reveal that patients with psychiatric disorders were significantly associated with obesity and ischemic heart disease compared with control. However, multiple stepwise logistic regression

Table 2 Distribution of medical conditions in control group and psychiatric patients group

	Control group (*n*=100) [*n* (%)]	Psychiatric patients group (*n*=83) [*n* (%)]	*P*
Medical conditions			
No	0	49 (59)	<0.001*
At least one	100 (100)	34 (41)	
Overweight			
Present	39 (39)	34 (41)	0.974
Absent	61 (61)	49 (59)	
Obesity			
Present	15 (15)	31 (37.3)	<0.001*
Absent	85 (85)	52 (62.7)	
Hypertension			
Present	27 (27)	26 (31.3)	0.521
Absent	73 (73)	57 (68.7)	
Ischemic heart disease			
Present	9 (9)	24 (28.9)	<0.001*
Absent	91 (91)	59 (71.1)	
Diabetes mellitus			
Present	10 (10)	13 (15.7)	0.250
Absent	90 (90)	70 (84.3)	
Cholesterol			
Present	37 (37)	33 (39.8)	0.702
Absent	63 (63)	50 (60.2)	
Triglycerides			
Present	11 (11)	15 (18.1)	0.172
Absent	89 (89)	68 (81.9)	

*Significant level at *P* value less than 0.05.

analysis proved that obesity and ischemic heart disease could predict the presence of psychiatric disorders. The processes that lead to comorbidity between psychiatric disorders and GMC are complex and bidirectional [12]. Psychiatric disorders may put a patient under stress that may facilities occurrence of GMC. On the contrary, medical disorders may lead to psychiatric disorders, and medical and psychiatric disorders may share common pathway. For example, chronic medical condition like migraine can lead to depression [13]. Moreover, major depression is now considered as a risk factor for cardiovascular disorders [14]. Exposure to prolonged stress since childhood may act as a common pathway that leads to medical and psychiatric disorders. Individuals exposed to childhood abuse for long period are more prone to having depression and chronic medical disorders [15]. One mechanism that may explain the relationship between stress and development of psychiatric and medical conditions is that prolonged exposure to stressors can modulate the response of immune system and increase the production of inflammatory responses, which act as a risk factor for comorbid disorders [16,17].

In our study, there is a significant association between psychiatric patients who live under low socioeconomic level with sedentary lifestyle and the development of comorbid GMC. There is a consistent relation

Table 3 Prevalence of overweight and obesity in psychiatric patients

	Overweight [*n* (%)]		*P*
	Present *n*=33	Absent *n*=50	
Schizophrenia	4 (12.1)	5 (10)	0.999
Depression	11 (33.3)	8 (16)	<0.045*
Bipolar	4 (12.1)	4 (8)	0.707
Anxiety	9 (27.4)	24 (48)	0.070
Neurocognitive	4 (12.1)	3 (6)	0.108
Other	1 (3)	6 (12)	0.235
	Obesity		*P*
	Present *n*=31	Absent *n*=52	
Schizophrenia	4 (12.9)	5 (9.6)	0.723
Depression	10 (32.3)	9 (17.3)	<0.048*
Bipolar	4 (12.9)	4 (7.7)	0.464
Anxiety	9 (29)	24 (46.2)	0.165
Neurocognitive	3 (9.7)	4 (7.7)	0.999
Others	1 (3.2)	6 (11.5)	0.248

Others (personality disorder, dissociative disorder, somatic symptom, and related disorder and eating disorder).*Significant level at *P* value less than 0.05.

Table 4 Prevalence of hypertension and ischemic heart disease in psychiatric patients

	Hypertension [*n* (%)]		*P*
	Present *n*=26	Absent *n*=57	
Schizophrenia	3 (11.5)	6 (10.5)	0.999
Depression	7 (26.9)	12 (21.1)	0.582
Bipolar	4 (15.4)	4 (7)	0.251
Anxiety	9 (34.6)	24 (42.1)	0.631
Neurocognitive	2 (7.7)	5 (8.8)	0.999
Others	1 (3.8)	6 (10.5)	0.425
	Ischemic heart disease		*P*
	Present *n*=24	Absent *n*=59	
Schizophrenia	3 (12.5)	6 (10.2)	0.714
Depression	7 (29.2)	12 (20.3)	0.400
Bipolar	3 (12.5)	5 (8.5)	0.685
Anxiety	8 (33.3)	25 (42.4)	0.472
Neurocognitive	2 (8.3)	5 (8.5)	0.999
Others	1 (4.2)	6 (10.2)	0.667

Others (personality disorder, dissociative disorder, somatic symptom and related disorder and eating disorder). *Significant level at *P* value less than 0.05.

between low socioeconomic level and sedentary lifestyle and mental and GMC [18]. Individuals with low socioeconomic status usually engage in nonhealthy behaviors, like eating unhealthy diet, smoking, and live in a sedentary lifestyle, which in turn increase the risk of GMC [19]. Low socioeconomic level is also associated with less available resources and increases the probabilities of exposure to stressful life conditions, that may increase the risk for comorbid GMC [20]. Furthermore, our results declared that the low socioeconomic status and sedentary lifestyle can predict the presence of psychiatric disorders.

Table 5 Prevalence of diabetes mellitus, hypercholesterolemia, and hypertriglyceridemia in psychiatric patients

	Diabetes mellitus [*n* (%)]		*P*
	Present *n*=13	absent *n*=70	
Schizophrenia	4 (30.8)	5 (7.1)	0.040*
Depression	2 (15.4)	17 (24.3)	0.978
Bipolar	2 (15.4)	6 (8.6)	0.605
Anxiety	4 (30.8)	29 (41.4)	0.550
Neurocognitive	1 (7.6)	6 (8.6)	0.999
Other	0	7 (10)	0.590
	Hypercholesterolemia		*P*
	Present *n*=33	Absent *n*=50	
Schizophrenia	4 (12.1)	5 (10)	0.999
Depression	10 (30.3)	9 (18)	0.286
Bipolar	4 (12.1)	4 (8)	0.707
Anxiety	9 (27.3)	24 (48)	0.070
Neurocognitive	5 (15.2)	2 (4)	0.108
Others	1 (3)	6 (12)	0.235
	Hypertriglyceridemia		*P*
	Present *n*=15	Absent *n*=68	
Schizophrenia	3 (20)	6 (8.8)	0.353
Depression	4 (26.7)	15 (22.1)	0.738
Bipolar	3 (20)	5 (7.4)	0.153
Anxiety	3 (20)	30 (44.1)	0.143
Neurocognitive	1 (6.7)	6 (8.8)	0.999
Others	1 (6.7)	6 (8.8)	0.999

Others (personality disorder, dissociative disorder, somatic symptom and related disorder and eating disorder). *Significant level at *P* value less than 0.05.

Table 6 Simple logistic regression analysis for prediction of psychiatric disorders

	OR	95% CI	*P*
Socioeconomic state			
High	Ref.		
Middle	0.988	0.445-2.19	0.976
Low	2.275	1.075-4.814	0.032*
Sedentary lifestyle			
Absent	Ref.		<0.001*
Present	4.34	2.156-8.739	
Obesity			
Absent	Ref.		0.001*
Present	3.378	1.667-6.847	
Ischemic heart disease			
Absent	Ref.		0.001*
Present	4.113	1.788-9.463	

CI, confidence interval; OR, odds ratio; Ref, reference. *Significant level at *P* value less than 0.05.

The most prevalent comorbid GMC are overweight and obesity (41 and 37.3%, respectively). This finding is considered higher than the prevalence of overweight and obesity worldwide according to WHO 2016 report, which declared that in general population, 39% of adults were overweight, and 13% were obese [21]. Our finding is in partial agreement with the finding of Kamel *et al.*[12] who found that

Table 7 Multiple logistic regression analysis for prediction of psychiatric disorders

	AOR	95% CI	*P*
Socioeconomic state			
High	Ref.		
Middle	0.546	0.213-1.399	0.207
Low	1.009	0.402-2.498	0.985
Sedentary lifestyle			
Absent	Ref.		<0.001*
Present	7.84	3.53-17.412	
Obesity			
Absent	Ref.		0.008*
Present	3.323	1.367-8.073	
Ischemic heart disease			
Absent	Ref.		0.010*
Present	3.651	1.37-9.727	

AOR, adjusted odds ratio; CI, confidence interval; Ref., reference.
*Significant level at *P* value less than 0.05.

Table 8 Multiple stepwise logistic regression analysis findings for prediction of psychiatric disorders

	AOR	95% CI	*P*
Sedentary lifestyle			
Absent	Ref.		
Present	7.296	3.368-15.804	<0.001*
Obesity			
Absent	Ref.		
Present	3.232	1.406-7.427	0.006*
Ischemic heart disease			
Absent	Ref.		
Present	4.166	1.605-10.818	0.003*

AOR, adjusted odds ratio; CI, confidence interval; Ref., reference.
*Significant level at *P* value less than 0.05.

the prevalence of comorbid GMC among psychiatric patients was 44.6% for overweight and 22.3% for obesity. This partial agreement could be explained by the fact that their patients were not under psychotropic medications. Moreover, our result is supported by many studies conducted on different countries with different ethnic group of patients [22–24]. In contrast to our finding, Marthoenis *et al.*[25] reported that the prevalence of overweight and obesity in psychiatric patients were 8 and 5%, respectively. These figures are not only lower than our figure but also lower than the figure in the general populations. They explained their finding to the fact that the patients included in their study were inpatient only and had eaten only the food that were provided to them by the hospital. In our study, the prevalence of ischemic heart disease is significantly higher than the reported figure in control individuals. This finding was supported by the study of Ibrahim *et al.*[26] who reported that the prevalence rate of cardiovascular disease was 8.3% among adult population. Moreover, the prevalence rate of cholesterol and triglyceride is higher than the levels in general population according to WHO stepwise noncommunicable diseases surveillance 2011–2012, which reported that adults aged from 15 to 65 years have prevalence of hypercholesterolemia (36.7%) and hypertriglyceridemia (10.2%) [27]. The high prevalence of our results may be attributed to many complex and interrelated factors, like (a) the high prevalence of overweight and obesity; (b) 83% of our psychiatric patients were adherent to more than one psychotropic medications which increase the risk for metabolic disorders; (c) 44% of our psychiatric patients have chronic medical disorder, which increases the risk for acquiring unhealthy behaviors like smoking, eating unhealthy food, and live in a sedentary lifestyle; and (d) 53% of our patients have low socioeconomic status and 51% are illiterate, which is associated low quality of medical care.

In the present study, we noticed that the prevalence of comorbid GMC varies according to psychiatric diagnosis. The prevalence of overweight and obesity is significantly more in depressive patients; however, diabetes mellitus is significantly more common among schizophrenic patients. Our findings are supported by the findings of the survey study conducted by Scott *et al.*[28] in 13 different countries, as a part of the World Mental Health Survey. They reported that there was a significant association between depression and obesity. Moreover, de Hert *et al.*[29] reported that 23.4% of the studied schizophrenic patients had diabetes mellitus.

Conclusions

Although we did not study all possible comorbid general GMC that may be associated with psychiatric disorders, we found that near half of our psychiatric patients had at least one comorbid GMC. Moreover, obesity and ischemic heart disease were considered as independent factors for prediction of occurrence of psychiatric disorders. Low socioeconomic status and sedentary lifestyle could share in explanation of the complex process of comorbidity between psychiatric disorders and GMC.

The point of strength that our study highlighted is the importance of studying complex and interrelated pathways between psychiatric and medical disorders.

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Conflicts of interest

There are no conflicts of interest.

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