ORIGINAL ARTICLE

Holistic assessment of patients with chronic mental disorders who attend a metabolic clinic in Sligo Town catchment area

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Abstract

Background People with serious mental illness exhibit higher morbidity and mortality rates of chronic diseases than the general population.

Aims The aim of this study was to establish a dedicated clinic for patients with chronic mental illness to monitor physical health and quality of life in accordance with best practice guidelines.

Methods Patients were invited to attend the clinic. The following areas were examined: personal and family history of cardiovascular disease, diet, exercise, and smoking. Mental state examination, waist circumference, BP, pulse, ECG and BMI. Laboratory tests including U + E, LFTs, HbA1c, Lipid profile and other tests as appropriate such as serum lithium. AIMS scale, HoNOS and WHOQOL-BREF scales as additional indicators of global health.

Results A total of 80 patients attended during 3.5 years of clinic. Mean age was 54.9 years (SD: 13.81) at first contact and 45% were females. Mean years in the service was 19.66 (SD: 11.54) and mean number of previous hospital admissions was 4.4 (SD: 5.63). Metabolic syndrome was present in 42% at first assessment. A statistically significant improvement was found for the psychological domain of the WHOQOL-BREF and the HoNOs, particularly at third assessment. ($\beta = 4.64$, Wald $x^2 = 7.38$, df:1, $p = 0.007$, CI:1.3–8.1, $\beta = -.889$, Wald $x^2 = 4.08$, df:1, $p = 0.043$, CI: -1.752 to $-.026$) respectively.

Conclusion The results show a high prevalence of physical health conditions in this cohort, some of which represent a new diagnosis. This implicates better allocation of existing resources for screening and early detection, and potential to run joint clinics with primary care.

Keywords Chronic mental illness · Metabolic · Physical health · Quality of life

Introduction

Individuals with severe mental illness (SMI) have a life expectancy of 8–32 years shorter than the general population and have a 2–threefold increased mortality, 60% of which can be attributed to physical illness [1]. A significant proportion of increased morbidity and mortality has been related to modifiable cardiovascular risk factors [1, 2]. These include sedentary lifestyle, increased smoking, genetic predisposition, unhealthy diets, and medication side effects [3]. Other causes may include emergence of extra pyramidal side effects with the medication, e.g., tardive dyskinesia. This implies that a holistic assessment for early detection and intervention can help to improve expectancy and quality of life.

SMI, a term used in the context of schizophrenia (SCZ), bipolar affective disorder (BPAD), schizo-affective disorder and major depressive disorder (MDD), predisposes to different physical health conditions including cardiovascular, respiratory, urogenital, nutritional, and metabolic diseases and bacterial and viral infections [1]. There is evidence that people with SMI are at increased risk of morbidity and mortality from Covid-19 pandemic [4]. It was therefore, advocated to prioritise them for Covid-19 vaccination [4]. Obesity is another

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cause of concern in SMI and may be associated with lifestyle choices, negative impact of mental illness, e.g., depression as well as weight gain potential of psychotropic medication [1]. About half to three quarters of patients with SCZ have coronary heart disease (CHD) which leads to 90% higher death rate in this cohort [5]. SMI confers a 2–threefold increased risk of diabetes mellitus which can be linked to obesity and metabolic syndrome (MetS) [1]. The risk of MetS is increased 2–3 times in SMI and is estimated to be 50% prevalent in people with SMI in western countries [6]. MetS increases the risk of developing type 2 diabetes mellitus by 5–sixfold, increased mortality due to CHD by 3–sixfold and can be an etiological factor in colon cancer [1].

MetS is a constellation of abnormal findings including impaired fasting glucose (≥ 110 mg/dl), central obesity (waist circumference > 102 cm in men and > 88 cm in women), raised blood pressure (Systolic ≥ 130 and/or diastolic ≥ 85 mm Hg), elevated triglycerides (≥ 150 mg/dl), and low high-density lipoproteins (HDL) levels (< 40 mg/dl in men and < 50 mg/dl in women) [7].

Tardive dyskinesia (TD), another long-term sequela of antipsychotic medication, is a form of abnormal involuntary muscle movements that can develop after prolonged use, reduction of, or discontinuation of antipsychotics [8]. These abnormal movements can happen in the tongue, lower face, jaw, trunk or extremities and can be accompanied by sensory phenomenon like akathesia, pain and parasthesia in some cases [9]. It must persist for at least a month after the treatment with offending drug is discontinued. TD is irreversible for most patients and can continue to persist despite stopping the medication that causes it. The term "Tardive Dyskinesia" was first coined in 1964 by Faurbye due to delay in the onset of abnormal movements after the initiation of treatment with the offending drug [10]. The DSM-V definition of TD is helpful to diagnose cases secondary to neuroleptic medication [8]. Prolonged blockade of dopamine receptors (D2) in the brain leads to hypersensitivity of these receptors leading to an exaggerated response to dopamine at the post-synaptic receptors [11]. Second generation antipsychotics (SGA) were expected to be safer regarding extra-pyramidal side effects as compared to first generation antipsychotics (FGA). However, Carbon et al. [12] found that relative to FGA treatment, the SGA treatment still had a class-wide TD prevalence of 20.7% and illustrates that despite high expectations of SGA treatment limiting the risk of TD, it has not led to a marginalization of TD. In addition, there is evidence of development of TD with several drugs other than antipsychotics. These include antidepressants, anticonvulsants, mood stabilisers, anticholinergic agents, anxiolytics, antiemetics, antihistamines, decongestants, antimalarials, antiparkinsonian agents, biogenic amines and stimulants [11]. TD affects the social functioning of

patients and their compliance with treatment. McEvoy et al. [13] demonstrated in a cross-sectional survey that patients with TD had significantly worse health-related quality of life and increased social withdrawal as compared to patients without TD and general population.

In view of the above need for monitoring overall health and quality of life of patients with SMI taking psychotropic medications, a holistic clinic was set up in one community sector of Sligo/Leitrim Mental Health Services [14]. A clinical proforma was designed that focussed on psychiatric diagnosis/es and treatment along with lifestyle, medical and family history. There is good evidence that introduction of a structured proforma improves adherence to the monitoring guidelines [15, 16]. In addition to that, we used validated instrument tools to measure outcomes (see Methods section for details). Apart from the physical and mental status assessments, several interventions were also offered including psychoeducation, adjustments in medication, referral to occupational therapy or for smoking cessation. The clinic started in the year 2016 and was suspended beginning of 2000 because of Covid-19 restrictions.

Therefore, this paper aims to answer the question: "Can a dedicated metabolic screening clinic improve physical health outcomes in those with SMI?" In addition, we aimed to assess the quality of life and its relationship with the tardive dyskinesia.

Methods

Study design

Observational longitudinal study

Setting/subjects/referral pathway The clinic was operated in the Day hospital where facilities for clinical examination, ECG, and phlebotomy were available. The clinic accepted referrals from any team member. Inclusion criteria was patients with long standing severe mental illness and/or taking prescribed psychotropic medications.

Data collected

(a) Demographics (age, gender)
(b) Diagnosis(es) Physical and Mental
(c) Number of the years in the service
(d) Number of previous admissions
(e) Clinical variables: BMI > 25 kg/m^2 coded as abnormal, Waist circumference > 102 cm in men and > 88 cm in women coded as abnormal, Blood Pressure ≥ 130 and/ or diastolic ≥ 85 mm Hg coded as hypertension.

(f) Investigations: ECG: Prolonged QTc (QTc > 440 ms for males QTc > 460 ms for females), Fasting Glucose levels (≥ 110 mg/dl), HbA1c normal range below 42 mmol/mol), LFT's [Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), Alkaline Phosphatase (ALP), Gamma-Glutamyl Transferase (G-GT)], Lipid profile (levels of Cholesterol, Triglyceride, HDL, LDL), U&E (Urea, Creatinine, Na, K, Cl, eGFR). The normal range of the last three is given in the footnote of Table 2, Thyroid function tests: T_4 normal range 12.0–22.0 pmol/L, and TSH (normal range 0.27–4.67 pmol/L).

(g) Life style (self-reported questions on smoking habits, exercise and diet). Smoking habits were coded as currently smoker, ex-smoker, and never smoke. Exercise was coded as regular, irregular, and limited. Diet was coded as normal (eating normal food without giving particular attention), healthy (those who paid particular attention and ate only healthy food), and unhealthy (those who tended to eat more unhealthy food).

(h) Scales/measurements

AIMS: Abnormal Involuntary Movement Scale. It is a 12-item clinician rated scale that records the occurrence of tardive dyskinesia in patients taking antipsychotic medication [17]. It can be used to detect and assess the severity over time. Examination for tardive dyskinesia by AIMS includes facial and oral movements, extremity and truncal dyskinesia, global severity, and dental status. Higher scores indicate a more severe form of tardive dyskinesia. For categorical use of the scale total of 0 or 1 indicated no tardive dyskinesia and ≥ 2 showed dyskinesia.

(i) Outcome measurements

HoNOs: Health of the Nation Outcome Scale. It was developed by RCPsych Research Unit in 1996 to measure health and social functioning of people with mental disorders [18]. It is a clinician-rated 12-item instrument measuring behaviour, impairment, symptoms, and social functioning. Higher scores indicate increased severity of symptoms.

WHOQOL-BREF: World Health Organization Quality of Life Brief. Its development was initiated in 1991 with the aim to develop an international cross-culturally comparable quality of life assessment instrument [19]. It assesses the individual's perceptions in the context of their culture and value systems, and their personal goals, standards, and concerns. WHOQOL-BREF is a shorter version of the original instrument and may be more convenient for use in large research studies or clinical trials. It comprises 26 items, which measure the following four domains: physical health, psychological health, social relationships, and environment. Items are scored to calculate a total score for each domain as per WHO document instructions. Raw domain scores are converted to 'transformed scores' /100 as per table in manual which is comparable to the original WHOQOL document. Higher scores indicate better quality of life.

Data analysis

Descriptive statistics are presented as counts and proportions for categorical variables and as means and Standard Deviations (SD) for continuous ones. The Generalized Estimating Equations method (GEE) was used to analyse longitudinal data (outcome measurements WHOQOL-BREF and HoNOs). This takes into account the fact that observations within a subject are correlated and estimate the population average across time. The estimated coefficients (beta) reflect the relationship between the longitudinal development of the dependent variable and the longitudinal development of the predictor variables (in this particular case the occasion of the assessments) using all data. Little's MCAR test was used to examine any systematic missing values. For GEE analysis the AR(1) autoregressive working correlation matrix structure was assumed, with link function identity. IBM SPSS v25 software was used for the analysis.

Results

(a) Demographics

Eighty participants attended the metabolic clinic between 2016 and 2020. Forty-four (55%) were males with a mean age of 54.5 years (SD = 13.8). The mean duration of attending mental health service was 19 years (SD = 11.5), and the mean number of hospital admissions was 4.43, SD = 5.62 (median = 2.5, min = 0, max = 38, IQR = 5). The maximum number of assessments was 6 but because only few had 5th and 6th assessment, only the first 4 were analysed (see Table 1).

(b) Years in the service/ number of previous admissions.

The mean years in the service of this cohort was 19.66 (SD: 11.54) median = 19, minimum 1 year, maximum 51. The mean number of previous admissions in

Table 1 Number of assessments

		N	Percent
Number of assessments	1	80	41.7%
	2	53	27.6%
	3	37	19.3%
	4	15	7.8%
	5	6	3.1%
	6	1	0.5%
	Total	192	100.0%

Table 2 Results of comparisons between those with TD and those without in continuous variables

	Age	Years in the service	Domain 1: Physical Health	Domain 2: Psychological	Domain 3: Social Relationships	Domain 4: Environment	HoNOs score
Mann–Whitney U	680.500	753.500	651.500	545.000	569.500	609.000	433.500
Wilcoxon W	1808.500	1314.500	1147.500	1491.000	1065.500	1555.000	1561.500
Z	−.929	−.215	−.165	−1.345	−1.074	−.635	−3.384
p	.353	.830	.869	.179	.283	.526	**.001***

*In **bold** significant differences

the hospital was 4.4 (SD: 5.63) median = 2.5 minimum 0 maximum 38. Sixteen people out of the 80 (20%) did not have any previous admission in the hospital.

(c) Psychiatric diagnoses

The distribution of main diagnoses was: Schizophrenia, schizotypal and delusional disorders (F20–29) $n = 52$ (65%), Mood [affective] disorders (F30-F39) $n = 26$ (32.5%), others $n = 2$ (2.5%).

(d) Antipsychotic medications

Fifty-nine (73.8%) patients were prescribed one antipsychotic medication whereas 15 (18.8%) patients were taking two antipsychotics. Six patients (7.5%) were without antipsychotics. From the 74 who were on antipsychotics 59 (79.7%) had prescribed a new generation antipsychotic, 9 (12.2%) an old generation antipsychotic and 6 (8.1%) were in a combination of an old and new generation antipsychotic.

(e) Tardive dyskinesia

The mean of the AIMS at first assessment was 2.71, SD: 4.12 (median = 0, min = 0, max = 20, IQR = 5). According to the AIMS, 33 (41.8%) of the patients had tardive dyskinesia. There were no differences between the genders ($x^2 = 1.936$, df:1, $p = .164$). Also, no difference was found regarding the age, (Mann–Whitney $U = 680.5$, z = .93, $p = .353$), years in the service and quality of life (see also Table 2). However, those with tardive dyskinesia

had higher HoNoS scores (Mann–Whitney $U = 433.500$, z = 3.38, $p = .001$).

In addition, the number of antipsychotics used did not have any association with tardive dyskinesia ($x^2 = 1.79$, df:2, $p = .426$), but the type of the antipsychotics did. Old generation antipsychotics were more associated with tardive dyskinesia compared to new generation antipsychotics ($x^2 = 8.73$, df:2 $p = .013$).

(f) Life style

Smoking habits, diet and exercise as self-reported are presented in Table 3.

As can be seen from Table 3, the majority of the patients were smokers but most of them reported that they had regular exercise and followed a healthy diet.

(g) Metabolic syndrome: Briefly 33 (42.3%) patients already had a metabolic syndrome at first assessment (3 or more abnormal factors) while 45 (57.7%) did not, (2 had missing data). An abnormal BMI (> 25 kg/m^2) was present in 59 patients (80%) at first assessment and high waist circumference (> 102 cm in men and > 88 cm in women) was significantly more common in females. Newly diagnosed physical problems were identified in twenty patients. (see also Usman et al. [14] for more details regarding metabolic syndrome results).

(h) Outcome measurements

Table 3 Smoking habits, exercise, diet

		Male Count (n)	Male %	Female Count (n)	Female %	Totals
Smoking habits	No smoker	11	45.8	13	54.2	24
	Ex-smoker	8	61.5	5	38.5	13
	Smoker	24	55.8	19	44.2	43
Exercise	Regular	32	64.0	18	36.0	50
	Irregular	9	34.6	17	65.4	26
	Limited	2	50.0	2	50.0	4
Diet	Normal	8	57.1	6	42.9	14
	Healthy	25	55.6	20	44.4	45
	Unhealthy	10	47.6	11	52.4	21

Table 4 Means and Standard Deviation of the WHOQOL-BREF and HoNOs scores across the assessments

			Physical Health	Psychological	Environment	Social Relationships	HoNOs
Assessment	**1**	Mean	65.71	64.77	72.97	64.47	3.21
		S. D	18.84	18.41	17.25	20.35	2.96
	2	Mean	63.31	65.04	72.92	65.16	2.87
		S. D	16.79	13.76	13.81	19.97	2.69
	3	Mean	69.86	71.78	76.64	69.06	2.11
		S. D	15.77	15.09	15.01	15.55	2.41
	4	Mean	71.50	73.79	76.07	65.43	2.13
		S. D	18.24	15.27	19.60	21.54	3.20

Quality of life (WHOQOL-BREF Transformed score 0–100), HoNOs:

Descriptive statistics are shown in Table 4.

Table 4 shows more improvement in the average scores of physical and psychological well-being of the cohort and less so in the environmental and social domains. Also, the HoNOs scores were reduced on subsequent assessments (which shows improvement). Next, the data was analysed longitudinally to find out if there was significant improvement.

Longitudinal analysis of WHOQOL-BREF, and HoNOs

Figures 1 and 2 show the trajectory of the scores of the WHOQOL-BREF and HoNOs respectively.

Missing data

Little's MCAR test ($\chi^2 = 2.61$, df:1, $p = 0.106$) showed that the missing data appeared to be Missing Completely At Random.

GEE models

Five GEE models were constructed with each of the outcome variables (the four domains of the WHOQOL-BREF; Physical Health, Psychological, Social Relationships, Environment and the HoNOs) as the dependent variable each time, and the number of assessments, TD (dichotomous), diagnoses (three categories) and demographic variables (age, gender) as independent variables of interest. Variables with no significant effects were dropped one by one until a parsimonious model was achieved. Although Table 4 and graphs 1 and 2 demonstrate an improvement across the assessments, the GEE analyses have shown that this improvement was statistically significant only for the Psychological domain of the WHOQOL-BREF and the HoNOs and particularly at 3rd assessment compared to the first (beta estimate $= 4.64$, Wald $x^2 = 7.38$, df:1, $p = 0.007$, CI:1.3–8.1 and beta estimate $= -.889$, Wald $x^2 = 4.08$, df:1, $p = 0.043$, CI: -1.752 to -0.026) respectively. No significant effects were found on the five main outcomes in terms of gender, age, diagnosis, and TD.

Discussion

This newly established pilot clinic highlighted the presence of modifiable cardiovascular risk factors, some of them represented new diagnoses. This occurred for one quarter of our sample and endorses the importance of close liaison with General Practice as shown in a study by Ali et al. [20] that coordination between GPs and psychiatrists is essential for timely screening of metabolic parameters.
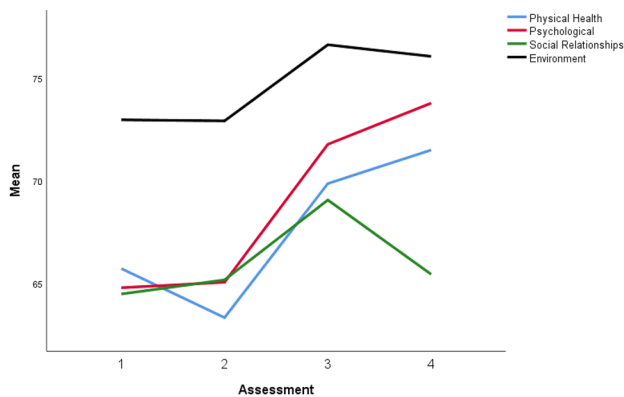

Fig. 1 Trajectory of WHOQOL-BREF scores across the assessments
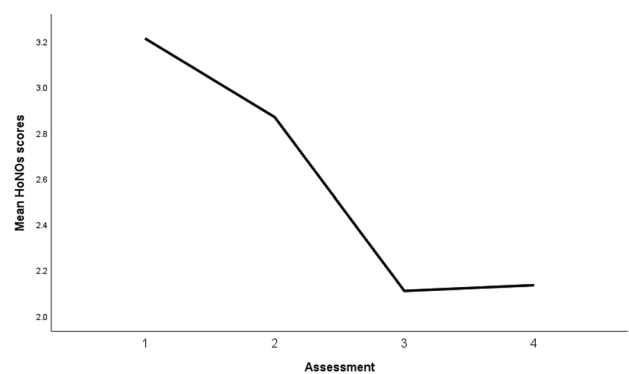

Fig. 2 Trajectory of HoNOs scores across the assessments

AIMS score indicated a low prevalence of tardive dyskinesia in this population. The average yearly rate of developing TD after antipsychotics exposure is 4–5 with 10-year rate as 49 [17]. It would be interesting to find the duration of antipsychotics exposure and then correlate with the severity of TD. It is expected that new generation antipsychotics are less likely to cause motor side effects than the older ones. However, a meta-analysis of randomised controlled trials shows that four second-generation antipsychotics (zotepine, lurasidone, risperidone, and paliperidone) produced significantly more side effects than placebo [21].

QOL and global functioning are considered important parameters for the success of psychiatric treatment [22]. The results showed a reasonably high QOL among this cohort of patients contrasting much of the current literature surveying QOL in similar populations. QOL is a complex multidimensional entity, and its assessment relies on subjective reporting and analysis as supported by validated instrument tools. Among its four domains, social relationships scored the lowest. This may suggest a lack of socialisation associated with chronic mental illness and can be a potentially useful focus to improve the QOL. There is evidence of improved QOL with positive and supportive relationships as these lead to a sense of belonging [23]. A number of those who scored low in the first assessment in the social and environmental domains were referred for OT interventions. Despite the fact that there was an improvement in the subsequent assessments, it seems that this improvement was not sustainable for a long time in the social relationships domain and perhaps other interventions were needed.

Our results show that majority of the patients were smokers but followed healthy diet and exercise. This observation was self-reported by the patients, but it contrasts much of the existing literature that individuals with SMI have unhealthy eating habits and sedentary lifestyle [3]. It is likely that the patients did not have insight into their diet and levels of activity. This could be improved by providing them a brief explanation of what constitutes a healthy diet and cut-off of physical activity level per week; a pictorial representation may serve well for this purpose.

Strengths and limitations

A reasonably good number of patients attended this holistic clinic and were followed up longitudinally. Some of these patients with chronic mental illness had not had metabolic monitoring for a while although there were few missed appointments. The use of a proforma improved the consistency of recording observations. This study was carried out on patients in real-life setting so the results can be applicable to other settings but should be interpreted with caution. As this was a pilot clinic that started in an informal manner, we used the clinical experience of team members for including the patients rather than a formal inclusion and exclusion criteria. So, although patients invited to the clinic were known to the service over the years, the date of diagnosis was not formally documented. The presence or absence of former medical diagnoses was ascertained by combination of patient history, psychiatry clinical notes and medications but was not co-checked with GP notes. Similarly, former lab results were ascertained by search of hospital lab system and psychiatry clinical notes that could potentially exclude the results from GP. This was perhaps unlikely as most GPs covering this patient area process bloods via Sligo University Hospital laboratory. Although attendees of the metabolic clinic and staff gave positive feedback, this was not formally assessed or measured (e.g. satisfaction scales). WHOQOL-BREF can be a useful tool for assessing QOL in diverse areas [22]; however, there was a subjective impression that some patients had difficulty understanding questions and that others did not like the reinforcement of their mental illness. We also offered few interventions to patients like smoking cessation and psychoeducation. However, because we designed this study as observational and not interventional, we did not measure the outcome of the interventions.

Implications

Establishing a dedicated clinic for holistic assessment of patients with chronic mental illness is feasible as it does not require extra resources, rather better allocation of the already existing resources. It clearly takes some extra clinical time, thus implying an expansion of appointment time. However, this time is well spent for improving quality of life of patients which is the vital aim of any medical professional. This also suggests a possibility of establishing a joint metabolic clinic with GPs for shared care.

Declarations

assert that ethical approval for this research was granted by the local ethics committee. Informed consent was obtained from all participants.

Conflict of interest The authors declare no competing interests.

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