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Prevalence of Metabolic Syndrome in Psychiatric Inpatients: A Naturalistic Study

Julie Robinson [1], Merzaka Derradjj [1], Chhaya Pandit [1], Anuja Batugedara[1], Tariq Mahmood[1]

[1] **Leeds Partnerships NHS Foundation Trust**

Prevalence of Metabolic Syndrome in Psychiatric Inpatients: A Naturalistic Study

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Abstract

The aim of this naturalistic survey was to measure the prevalence of metabolic syndrome by collating data on routine physical investigation in an acute psychiatric inpatient population. The size of this study is small, but the results offer some interesting and useful preliminary findings, pertinent to the provision of good physical health care to psychiatric inpatients and from which further research could develop.

Metabolic syndrome was found in more than a third (38%) of the population studied and was equally prevalent across a variety of psychiatric disorders. A higher trend was found in females than in males, but this figure did not reach statistical significance. Although small, the naturalistic setting of this survey demonstrates the ease with which metabolic syndrome can be opportunely excluded or identified in this vulnerable population, where physical healthcare is often problematic. With the increasing involvement of non-medically qualified practitioners in psychiatric care, simple techniques such as this hold a valuable place in holistic patient management.

Key words: Survey, Metabolic Syndrome, Physical Health, Inpatients, Antipsychotics

Introduction

Those with schizophrenia and other major mental illnesses have been found to be physically less fit than the general population (Newman and Bland, 1991), with an increased risk of cardiovascular morbidity and mortality (Brown 1997; Casey 2005). In most cases, the origin of this increased risk is multi-factorial, including genetics, lifestyle factors and the regular use of psychotropic medication.

With regard to the role of genetics, evidence suggests metabolic disturbance to be an inherent part of psychotic illness, rather than a consequence of treatment. Higher rates of abnormal glucose metabolism in schizophrenia were recognised prior to the introduction of antipsychotics in the 1960's and Mukherjee et al (1989) found rates of type 2 diabetes mellitus in family members of schizophrenics to be between 19 and 31% - exceeding that found in the background population. In a more recent review, medication free first episode schizophrenics were found to have already increased rates of obesity and impaired fasting glucose metabolism (Thakore, 2004). Smoking, inadequate physical activity, poor diet and concomitant drug and alcohol use are some of the significant lifestyle factors seen in schizophrenia which impact upon cardiovascular health.

Metabolic Syndrome

Metabolic syndrome, a cluster of signs and symptoms, has been found to have a correlation with increased cardiovascular risk. Whilst prevalence of the syndrome in non-psychiatric populations ranges between 6 and 11% (Saari et al, 2005; Mackin et

al, 2007) estimates of its prevalence have been found to be high (up to 54%) in community samples of psychiatric patients on regular antipsychotic medication. (Mackin et al, 2007; Lamberti et al, 2006; Morgan et al, 2008) Originally operationally defined in 2002 by the National Cholesterol Education Programme (NCEP) the definition of metabolic syndrome was adapted in 2005 by the International Diabetes Federation (IDF, 2005) - it is this latter and most recent definition which we use in our survey.

Figure 1 – 2005 IDF Criteria for Metabolic Syndrome

Metabolic syndrome is defined as -

1. Abdominal obesity measured as waist circumference more than or equal to 94cm in men and 80cmin women

Plus two or more of the following

2. Raised triglycerides (TG) more than or equal to 1.7mmol/L*

3. Reduced high density lipoprotein (HDL) cholesterol less than or equal to 1.0mmol/L in men and 1.3mmol/ in women*

4. Raised blood pressure more than or equal to 130/85mmHg*

5. Raised fasting blood glucose level (BGL) more than 6.1mmol/L

* or on treatment for this.

(IDF, 2005)

Metabolic Syndrome and Medication

Since their widespread introduction, second generation (atypical) antipsychotic agents (clozapine, olanzapine, amisulpiride, quetiepine, aripiprazole, zotepine and risperidone) have been promoted for use in schizophrenia. Whilst favourably associated with fewer neurological side effects, concerns remain regarding their potential to adversely affect metabolism, and thus research around medication and metabolic syndrome focuses on the role of first (typical) and second generation antipsychotics, rather than other medication.

Strong evidence exists for the association between antipsychotics and metabolic syndrome. In a large community based matched case-control study of severely mentally ill on (or recently on) anti-psychotics (Mackin et al 2007) found the case group to have higher rates of metabolic syndrome than controls, irrespective of whether they were prescribed first or second generation antipsychotics. A further large study of inpatients receiving only second generation antipsychotics identified metabolic syndrome in 47% of the sample (Correll et al, 2006).

A Dutch systematic review (Scheepers-Hoeks et al, 2008) investigating the differences in the metabolic effects of first and second generation antipsychotics summarises that although both groups appear to increase the risk of developing type 2 diabetes, it is the second generation ones which are more associated with obesity and dyslipidaemia. Comparison studies indicate that certain antipsychotics are more strongly associated with metabolic syndrome than others. In particular

olanzapine and clozapine (owing to their propensity for weight gain) are studied and evidence points to these two in particular being associated with a higher risk of developing the syndrome (Newcomer, 2007) with aripiprazole having a much lower risk of adverse metabolic effects. (L'Italien et al, 2007), (Haupt, 2006).

The National Institute for Clinical Excellence (NICE) (NICE Clinical Guideline 1, 2006) and the National Service Framework (NSF) (Department of Health, 2007) recommend regular physical health monitoring for patients with severe and enduring mental illness. However, significant difficulties can be associated with the delivery of good and regular physical healthcare to this group. Variable engagement and compliance coupled with periods of acute mental ill health seen in chronic mental illness make education and physical health monitoring a challenge - and it remains unclear as to what is the best way to identify those at risk in terms of their physical health.

We propose that psychiatric patients should be monitored for the presence of metabolic syndrome and an opportune time to do so is when they are hospitalised. Medical and psychosocial/educational interventions could be introduced during hospital admission. With this in mind we decided to investigate the prevalence of metabolic syndrome in acute psychiatric inpatients, in a naturalistic study design. As far as we know such a study has not been carried out before.

Method

Individuals admitted to 3 acute wards (2 male and 1 female) over a period of 4 consecutive months were considered. All those able and willing to consent to the use of their data in the survey and who agreed to full physical assessment were asked. Written informed consent was obtained and this survey was approved by the Leeds East Research Ethics Committee. A full physical examination including blood tests is considered a minimum requirement as part of the assessment of any new patient to the ward. Waist circumference is not normally recorded as part of the physical examination – this was an additional measurement to the usual examination.

Data were collected and recorded by the researchers on all those who consented. In addition to the criteria for metabolic syndrome (waist circumference, triglycerides, HDL (high density lipoprotein) cholesterol, blood pressure and fasting blood glucose level), the following was documented for each individual – age, gender, ethnicity, diagnosis and current medication. Chi squared was used as the test of statistical significance for the analysis of the categorical group data calculated from the recording of the metabolic syndrome criteria parameters. The Chi squared test was applied to look for significant differences between numbers where the syndrome was present versus absent and also in males versus females in the group where it was present.

Results

In total 14 females and 26 males were included. A small number (5) were deemed not capacitous or declined to be included in the study. The characteristics of the sample are displayed in Table 1. The sample included inpatients with a variety of psychiatric diagnoses. Men outnumbered women 1.9:1 and with regards to ethnicity, the sample was predominantly white and Asian.

Table 1- Characteristics of Sample

	Male	Female
N	26	14
Mean age (range)	42.3 (18-62)	41.7 (17-63)
Ethnicity		
White	17	13
Black	1	1
Asian	8	0
ICD-10 Diagnosis		
Psychosis	14	3
Paranoid schizophrenia **F20.0**	6	2
Delusional disorder **F22.0**	2	1
Acute schizophrenia-like psychotic disorder **F23.2**	6	0
Affective	11	7
Bipolar affective disorder, current episode severe depression **F31.4, F31.5**	2	1
Bipolar affective disorder, current episode manic **F31.1, F31.2**	3	3
Severe depressive episode **F32.2, F32.3**	6	3
Other	1	4
Alcohol withdrawal state **F10.3**	1	0
Emotionally unstable personality disorder – borderline type **F60.31**	0	2
Obsessive compulsive disorder **F42.2**	0	1
Organic hallucinosis **F06.0**	0	1

More than one third of our patients (38%) met the criteria for metabolic syndrome. (Table 2) Relatively more women than men had metabolic syndrome – however the trend did not reach statistical significance (χ^2 2.61 *df* 1 $p > 0.1$). There was no difference in the occurrence of metabolic syndrome when comparing psychotic illnesses (schizophrenia, delusional disorder and acute schizophrenia-like psychotic disorder) with affective illness (bipolar affective disorder and depression).

Table 2 – Numbers Meeting Criteria for Metabolic Syndrome According to Gender and Diagnosis

	Present n (%)	Absent n (%)
Psychiatric Inpatients	15 (38)	25 (62)
Male	8 (31)	18 (69)
Female	7 (50)	7 (50)
ICD-10 Diagnosis		
Psychotic	**7 (41)**	**10 (59)**
Paranoid schizophrenia	3	5
Delusional Disorder	3	0
Acute schizophrenia-like psychotic disorder	1	5
Affective	**7 (39)**	**11 (61)**
Bipolar affective disorder, current episode severe depression	3	0
Bipolar affective disorder, current episode manic	2	4
Severe depressive episode	2	7
Other	**1 (20)**	**4 (80)**
Alcohol withdrawal state	0	1
Emotionally unstable personality disorder- borderline type	0	2
Obsessive compulsive disorder	0	1
Organic hallucinosis	1	0

Further analysis of the data (focusing on antipsychotic prescription) showed that 9 of the group of 15 (60%) with metabolic syndrome were prescribed antipsychotic medication (Table 3). In 2 cases this was in combination with a second antipsychotic, and in 6 cases it was a sole second generation agent. Interestingly, 18 of the sample who were on antipsychotic medication did not fit the criteria for metabolic syndrome and 12 of this group were on second generation antipsychotics. The range of antipsychotics prescribed was wide and so inferences on specific

medications such as olanzapine and clozapine could not be made. Of the 4 participants who were prescribed aripiprazole 3 did not have metabolic syndrome.

Table 3 – Number of Participants Prescribed Antipsychotics

	Metabolic Syndrome	
	Present	Absent
	n	*n*
On antipsychotic	9	18
Not on antipsychotic	6	7
Single antipsychotic	7	18
Combination antipsychotic	2	0

Discussion

Significant Findings

- We found a high rate (38%) of metabolic syndrome in psychiatric inpatients. This figure is in keeping with the findings of previous surveys, ranging from 30% - 54%, in community psychiatric populations (Mackin et al, 2007; Lamberti et al, 2006; Morgan et al, 2008) and up to 47% in hospitalised patients. (Correll et al, 2006) In contrast, an extensive Finnish birth cohort study estimated the prevalence of metabolic syndrome in a non-psychiatric population to be only 6%, demonstrating the significance of psychiatric illness on physical health parameters. (Saari et al, 2005)

  Morgan's survey, also looking at psychiatric inpatients, detected a much lower rate (11%) than did our study. (Morgan et al, 2008). Although carried out on an inpatient population, this work is not directly comparable to ours as the sample were all long stay inpatients and treated with clozapine. The surprisingly low rate of metabolic syndrome in Morgan's study (given clozapine's widely acknowledged side effect of weight gain) could be due to those patients being more carefully physically monitored than they might have been in a more independent community setting – as a result of being long stay inpatients, staff can easily access this group to ensure good physical healthcare, also demanded by the clozaril patient monitoring service.

- We found a higher trend, which did not reach statistical significance, amongst female psychiatric inpatients. This trend has been reported elsewhere in similar studies. (Lamberti et al, 2006), (Morgan et al, 2008)

- The data for individual diagnoses was too small to be analysed in detail. However, no major difference in the figures for metabolic syndrome existed

when comparing those diagnoses considered under the broad heading of psychoses (schizophrenia, delusional disorder, acute schizophrenia-like psychotic disorder) and those under an affective heading (bipolar affective disorder and depression). This pattern of metabolic syndrome existing across a wide range of psychiatric diagnoses has been reported elsewhere. (Mackin et al, 2007; Correl et al, 2006). In our study, this widespread occurrence may be a consequence of the broad use of antipsychotics, not only for those with psychotic illness, but also for those with affective illness in its most severe form (for example requiring treatment for psychotic symptoms and high states of arousal).

- Metabolic syndrome existed in 9 out of 15 of those who were taking antipsychotics, all of whom were prescribed at least one second generation antipsychotic. This is in keeping with the findings cited earlier regarding the association between second generation antipsychotics and metabolic syndrome.

  What was surprising was our finding of 18 other participants, also on antipsychotic treatment, who did not have metabolic syndrome, 12 of whom were on second generation antipsychotic medication. We did not collect information on past antipsychotic treatment or current doses for our study – it may be that this group had only been very recently prescribed their medication or that the doses were low and hence had not yet influenced metabolism in any way.

  Patients with mental illness, treated with antipsychotics and admitted to the inpatient wards via the current mode of service delivery are by definition high risk, and hence demand enhanced and consistent care not only when hospitalised, but when in the community too. Another explanation for the above finding is that this potentially risky group is being well and regularly monitored, including good advice on lifestyle factors, in terms of both their physical and mental health, with the resulting effect that they have not developed metabolic syndrome. A further explanation (bearing in mind the strength of evidence for the role of antipsychotics in metabolic syndrome) is that this patient group are not fully medication compliant.

  In our sample only 4 were prescribed aripirazole – a second generation antipsychotic associated with being less likely to cause adverse metabolic effects. (L'Italien, 2007), (Haupt 2006). Only one of this group on aripirazole fitted the criteria for metabolic syndrome.

Clinical Relevance for Psychiatry

This survey has identified 38% of a sample of the local mental health service's most unwell and arguably most vulnerable service users to be at increased risk of cardiovascular disease, as predicted by the presence of the metabolic syndrome. Metabolic syndrome has its critics (Gale, 2008) but we propose that the simple, quick detection of risk factors is valuable in such patient groups.

Opportune detection of physical ill health indicators is important in the severely mentally unwell where physical health care and monitoring can be problematic. With the increased involvement in mental health of non-medically qualified practitioners, simplification which aids the understanding of physical health problems, for both care co-ordinators and patients, may prove to be helpful in achieving satisfactory, holistic management. Without a method such as this to easily detect important

physical health risks, how can this patient group be well cared for and offered appropriate treatment and advice to improve their physical (and mental) well being?

In special populations, where physical healthcare is even more problematic, such as those with learning disability or where other barriers to good physical healthcare from primary care exist, diagnosis of metabolic syndrome on contact with mental health services, and then as a tool for monitoring, has already been proposed. (Thakore, 2005) The naturalistic setting of this survey demonstrates the ease with which such a strategy can be implemented in an inpatient population.

Implications for General Practice and Public Health

The implementation of the National Service Framework for Mental Health in 1999, with the introduction of shared care, identifies general practitioners as responsible for the regular review of the physical healthcare of psychiatric patients. This is reflected in current NICE guidance for schizophrenia. (NICE Clinical Guideline 1, 2006) The presence or absence of metabolic syndrome, as a clear and definitive finding, can be easily communicated to and then acted upon by primary care practitioners. It also offers a method by which the baseline parameters can be monitored over time.

Limitations of this Study

The study provides an estimate of the prevalence of metabolic syndrome in psychiatric inpatients. The sample, however, was without a control group and relatively small and hence further statistical inferences about the relationship between medication (including medications other than antipsychotics), age or diagnosis with metabolic syndrome cannot be drawn. This is limited also by there having been no data collected on previous antipsychotic treatment or past medical history.

Conclusions

Our original aim was to measure the prevalence of metabolic syndrome in an acute psychiatric inpatient population and we detected a high rate of 38% in our sample. Our hope was that our findings could be used to inform the delivery of good patient care. The clinical relevance of this study's findings is high – a positive detection of metabolic syndrome provides a baseline from which to monitor and treat any emerging (and potentially life-threatening) cardiovascular problems. We have also demonstrated that measuring the criteria for metabolic syndrome is quick, simple and inexpensive. We therefore propose that the measurement of the metabolic syndrome parameters (including the recording of waist circumference) become routine for psychiatric inpatients.

This work warrants being taken further and we suggest a useful project would be to repeat the study with a larger sample and a control. An adequately sized comparison group from a general hospital setting matched for age, sex, ethnicity and socio-economic class status could be designed to investigate the association between both antipsychotic use and the presence of major mental illness with metabolic syndrome. The finding of metabolic syndrome as more frequent in women than in men also warrants special consideration and further study. Given that the responsibility for continuing physical healthcare lies in general practice, liaison with this part of the service regarding the communication and use of patient data on metabolic syndrome would be an essential step in any future work. Ideally the

presence or absence of metabolic syndrome ought to be included clearly on hospital discharge summaries and Care Programme Approach documents – a standard which lends itself easily to future audit.

We conclude that the measurement of metabolic syndrome is a useful and easily applicable way of identifying cardiovascular risk. Rates of metabolic syndrome in the psychiatric inpatient population are high and hospitalisation offers an opportune time to implement the criteria and therefore ought to be offered as a routine part of admission to hospital.

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Declaration of Interest

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References

Brown, S. 1997. Excess Mortality of Schizophrenia. A meta-analysis. British Journal of Psychiatry 171: 502-508.

Casey, D.E. 2005. Metabolic Issues and Cardiovascular Disease in Patients with Psychiatric Disorders. American Journal of Medicine 118 (suppl 2): 15S-22S.

Correl, C.U; Frederickson, A.M; Kane, J; Manu, P. 2006. Metabolic Syndrome and the Risk of Coronary Heart Disease in 367 Patients Treated with Second Generation anti-Psychotic Drugs. Journal of Clinical Psychiatry 67: 575-583.

Department of Health. 2007. National Service Framework for Mental Health Standards and Service Delivery: London, Department of Health.

Gale, E. 2008. Should We Dump the Metabolic Syndrome? Yes. British Medical Journal 336: 640-641.

Haupt, D.W. 2006. Differential Metabolic Effects of Antipsychotic Treatments. Eur Neuropsychopharmacol. Sep;16 Suppl 3:S149-55. Epub 2006 Jul 25.

International Diabetes Federation (IDF). 2005. The IDF Consensus World-Wide Definition of the Metabolic Syndrome.

Lamberti, S; Olson, D; Crilly, J; Olivares, T; Williams; C.G; Tu, X. 2006 Prevalence of the Metabolic Syndrome Among Patients Receiving Clozapine Therapy. American Journal of Psychiatry 163: 1273-1276.

L'Italien, G.J; Casey, D.E; Kan, H.J; Carson, W.H; Marcus, R.N. 2007 Comparison of Metabolic Syndrome Incidence Among Schizophrenia Patients Treated with Aripiprazole Versus Olanzapine or Placebo. Journal of Clinical Psychiatry.68(10):1510-6.

Mackin, P; Bishop, D; Watkinson, H; Gallagher, P; Ferrier, I.N. 2007. Metabolic Disease and Cardiovascular Risk in People Treated with Anti-Psychotics in the Community. British Journal of Psychiatry 191: 23-29.

Morgan, D; Sargeant, M; Chukwuma, J; Hughes, G. 2008. Audit of Metabolic Syndrome in Adults Prescribed Clozapine in Community and Long-Stay In Patient Populations. Psychiatric Bulletin 32: 177-179.

Mukherjee, S; Schnur D.B; Reddy, R. 1989. Family History of Type 2 Diabetes in Schizophrenic Patients. Lancet 1;495

National Institute for Clinical Excellence. 2006. Full National Clinical Guideline on Core Interventions in Primary and Secondary Care Clinical Guideline 1. London, NICE.

Newcomer J. 2007. Antipsychotic Medications: Metabolic and Cardiovascular Risk. Journal of Clinical Psychiatry 68; Suppl 4:8-13.

Newman, S.C; Bland, R.C. 1991. Mortality in a Cohort of Patients with Schizophrenia: A Record Linkage Study. Canadian Journal of Psychiatry 36: 239-245.

Saari, K.M; Lindeman, S.M; Viilo, K.M; Isohanni, M.K; Jarvelin, M-R; Lauren, L.H; Savolainen, M.J; Koponen, H.J. 2005. A 4-Fold Risk of Metabolic Syndrome in Patients with Schizophrenia: the Northern Finland 1966 Birth Cohort Study. Journal of Clinical Psychiatry 66: 559-563.

Scheepers-Hoeks, A.M; Wessels-Basten, S.W; Scherders, M.J.W.T; Bravenboer, B., Loonen, A.J.M; Kleppe, R.T; Grouls, R.J.T. 2008. Schizophrenia and Anti-Psychotics Associated with the Metabolic Syndrome. An Overview. Dutch Journal of Psych 50 10:645-654

Thakore, J. 2004. Metabolic Disturbance in First Episode Schizophrenia. British Journal of Psychiatry 184: s76-s79

Thakore, J. 2005. Metabolic Syndrome and Schizophrenia. British Journal of Psychiatry 186: 455-456.