Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy

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ORIGINAL RESEARCH

Health-related quality of life, adiposity, and sedentary behavior in patients with early schizophrenia: preliminary study

This article was published in the following Dove Press journal:
Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy
25 October 2012
Number of times this article has been viewed

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Objective: To examine adiposity and sedentary behavior in relation to health-related quality of life (QoL) in patients with early schizophrenia.

Methods: A cross-sectional study was used to assess adiposity by dual-energy X-ray absorptiometry scans, habitual physical activity and idle sitting time by the Short Form International Physical Activity Questionnaire, and health-related QoL by the RAND Medical Outcomes Study SF-36. QoL scores were compared with age-adjusted Canadian normative population data.

Results: There were 36 participants with early schizophrenia, average age 25.1 (±3.6). Twenty-nine (72.5%) were males. Mean illness duration was 30 (±18) months, and mean body mass index was 28.3 (±5). Females had higher body fat content than males (30.8 ± 6.9 vs 24.7 ± 10.6; $t = -2.6$, df = 34; $P = 0.015$). Total body fat (F = 14; $P = 0.001$), lean body mass (F = 10.2; $P = 0.001$), and sedentary behavior (F = 5; $P = 0.013$) significantly increased across body mass index categories. Total body fat was correlated with sedentary behavior (r = 0.62; $P = 0.001$), and total lean body mass was negatively correlated with sedentary behavior (r = 0.39; $P = 0.03$). Based on SF-36 scores, participants had significantly lower physical functioning ($P = 0.0034$), role physical ($P = 0.0003$), general health ($P < 0.0001$), vitality ($P = 0.03$), and physical component scores ($P = 0.003$) than Canadian population comparisons. Habitual sedentary behavior, more than activity or adiposity levels, was associated with health-related QoL in early schizophrenia.

Conclusion: Health-related QoL is lower in early schizophrenia and is predominantly experienced in the physical domain. QoL in early schizophrenia relates to sedentary behavior more than to activity and adiposity levels.

Keywords: obesity, CVD risk, activity levels, BMI

Introduction

Patients with chronic schizophrenia have higher rates of overweight and obesity than population comparisons.[1] Sedentary behavior is prevalent, while physical activity is low.[2,3] Other studies also report reduced health-related quality of life (QoL) in relation to body weight that is mostly experienced as a physical problem, irrespective of age and sex.[4,5] Concurrently, the physical fitness of patients with chronic schizophrenia is low and is inversely related to their body weight and especially body fat,[6] which renders them vulnerable to cardiovascular disease (CVD) and other adverse health outcomes,[2] prospectively worsening QoL further.[7]

However, while the relation of body composition, physical activity, and sedentary behavior with QoL has been studied extensively in healthy subjects,[8] there is far less corresponding data for the schizophrenia population. Because dimensions of QoL

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have been found to be associated with long-term outcome in schizophrenia,[7,9,10] we decided to explore potential relationships with body composition, physical activity, and sedentary behavior in a group of patients with early schizophrenia. This would determine any correlations among body composition (especially body fat), physical activity, sedentary behavior, and QoL, identifying modifiable behavioral risk factors for targeted intervention to improve QoL early in the course of schizophrenia and potentially reduce CVD morbidity and mortality.

Methods

A group of 36 subjects with early schizophrenia took part in a comprehensive metabolic assessment after written informed consent was obtained in accordance with procedures approved by the University of Toronto Research Ethics Board. This was a sample of convenience based on referrals from clinicians involved in treatment. Body weight and height were measured in kilograms (kg) and meters (m), and body mass index (BMI) was calculated (kg/m^2). Subjects were classified as normal weight if BMI was below 25, overweight if BMI was between 25 and 29.9, and obese if BMI was 30 or above, in accordance with National Heart, Lung, and Blood Institute guidelines.[11] The subjects were all on stable doses of antipsychotics for at least 2 weeks and were not actively psychotic at the time of the study. Prospective participants were not allowed to be receiving weight loss medication. Subjects provided sociodemographic information and completed the RAND SF 36-Item Short Form Health Survey.[12] The RAND SF-36 QoL questionnaire is a widely used and freely accessible measure of health-related QoL[13] that has also been validated in schizophrenia.[14] The questionnaire yields eight different items of functioning – physical functioning, role limitations due to physical problems, vitality, bodily pain, social functioning, role limitations due to emotional problems, mental health, and general health[13] – which are summarized into a physical component score and a mental component score. These two summary scores alone have been shown to account for 85% of reliable variance of the eight SF-36 subscores, without losing significant information.[15]

Whole-body dual-energy X-ray absorptiometry (DXA) scans (Hologic QDR-4500A densitometer; Hologic Inc, Bedford, MA) were completed to determine body composition, including total body mass and fat; total truncal mass and fat; and a truncal/LE ratio (proxy measure of body fat distribution). The Short Form International Physical Activity Questionnaire (SF-IPAQ), a structured screening instrument previously validated for the measurement of physical activity in schizophrenia,[16] was used to ascertain habitual physical activity; the questionnaire aims to elicit the amount of time in minutes spent daily in three different physical activity categories (expressed as "metabolic equivalents" per minute, or METmin/week) and in "idle time" – time spent sitting or lying (not sleeping), ie, sedentary behavior – for 1 week. The IPAQ has shown good correlation with accelerometry in schizophrenia.[16]

SPSS software (for Windows, version 18; SPSS Inc, Chicago, IL) was employed for data analysis. Descriptive analysis and frequency counts were carried out. Student's *t*-tests and, where appropriate, regression and analysis of variance (ANOVA) were employed to look for statistical differences between the means of two or more variables. Bivariate correlations among sociodemographics, SF-36 scores, body composition, and activity level were then calculated. For each SF-36 score with significant bivariate correlation with sociodemographic variables, activity level, and obesity measures, regression models were calculated to explore which variables predicted QoL. The SF-36 participant data was compared to a reference population drawn from Canadian normative data.[17]

Results

Of the 36 participants, 26 had a diagnosis of schizophrenia (61.5%) and ten had a diagnosis of schizoaffective disorder (38.5%). Twenty-nine (72.5%) were males. Seventeen (47.2%) were of European, 13 (36.1%) of African, three (8.3%) of Asian, and two (5.5%) of undetermined ethnic background. Average age among participants was 25.1 (±3.6) years; range (19–34) and duration of illness was 30 (±18) months. Twenty-seven (67.5%) were unemployed. Twenty patients were receiving clozapine (n = 10) or olanzapine (n = 10), and 16 were taking risperidone (n = 7), aripiprazole (n = 4), or ziprasidone (n = 5). Average duration of treatment with the current antipsychotic medication was 10.3 ± 7.5 months.

Mean body mass index was 28.3 (±5). Twelve participants (33.1%) were of normal weight (BMI 20–24.9), 13 (36.1%) were overweight (BMI 25–29.9), and eleven (30.6%) were obese (BMI > 30). Sixty-two percent were smokers, (8.7 ± 8 cigarettes/day, for 48 ± 5.2 months). Sixty-seven percent were unemployed, and 60% lived independently or at home with family. Physical activity level was 1707 (±1186) METmin/week, and sedentary time (excluding sleep) was 2916 (±1403) minutes/week. There were no significant differences in age, duration of illness, BMI, smoking,

employment, and living status and no differences in physical activity and sedentary time between males and females or across ethnicities. Females had higher body fat content than males (30.8% ± 6.9% vs 24.7% ± 10.6%; $t = -2.6$, df = 34; $P = 0.015$).

Body composition and physical activity

Total body fat (F = 14; $P = 0.001$), lean body mass (F = 10.2; $P = 0.001$), and sedentary behavior (F = 5; $P = 0.013$) significantly increased across BMI categories (normal weight, overweight, obese). Activity level (METmin/week) decreased, but the difference was not statistically significant (F = 0.3; $P = 0.71$). Total body fat correlated with sedentary behavior (r = 0.62; $P = 0.001$), but not with activity level. Total lean mass was not correlated with METmin/week (r = 0.049; $P = 0.8$) but was inversely correlated with sedentary time (r = 0.39; $P = 0.03$). We did not find ethnic differences in activity levels (F = 0.57; $P = 0.64$) or sedentary behavior (F = 1.8; $P = 0.9$).

SF-36 scores of study subjects were compared to standardized Canadian population scores and are shown in Table 1.

Among study participants, physical functioning (F = 4.41; $P = 0.02$) and role physical (F = 6.02; $P = 0.006$) significantly worsened across BMI categories. As compared to nonobese subjects, obese subjects (BMI > 30) had worse physical functioning ($t = 2.9$; $P = 0.006$), role physical ($t = 3.5$; $P = 0.001$), and general health ($t = 2.1$; $P = 0.036$) scores. Smokers had worse physical functioning ($t = -2.1$; $P = 0.04$) and more bodily pain ($t = -2.8$; $P = 0.009$) than nonsmokers. Employed participants had significantly better role emotional functioning ($t = 29$; $P = 0.044$) than unemployed participants.

Relationships among body composition, quality of life, and activity levels

Sedentary behavior correlated with role physical (r = –0.331; $P = -0.001$) and vitality (r = 0.53; $P = 0.001$) and correlated inversely with emotional wellbeing (r = –0.403; $P = 0.018$). Total body fat inversely correlated with physical function (r = –0.39; $P = 0.027$), role physical (r = –0.466; $P = 0.008$), and vitality (r = –0.49; $P = 0.005$).

Physical functioning was predicted by smoking status (F = 4.7; $P = 0.016$) and sedentary behavior (F = 4.4; $P = 0.043$). Bodily pain was predicted by age (F = 6.1; $P = 0.006$) and total body fat percentage (F = 6.9; $P = 0.014$).

Discussion

Results from our sample indicate that early schizophrenia is associated with lower QoL than observed in mentally healthy population comparisons and that this manifests primarily in lower physical functioning. It is important to note that all

Table 1 SF-36 subscores of participants with early schizophrenia, compared to age-adjusted population standards

SF-36 items	Population n = 399		Participants n = 36		*P*-value
	Mean	SD	Mean	SD	
Physical functioning	92.4	14.6	84.7	19	$P = 0.0034$ $t = 2.95$
Role physical	87.1	29.3	68.1	33.1	$P = 0.0003$ $t = 3.69$
Bodily pain	77	21.8	87.2	14.8	$P = 0.006$ $t = 2.75$
General health	79	16.1	58.3	19.5	$P = 0.0001$ $t = 7.25$
Vitality	64.9	17.7	58.1	21.7	$P = 0.031$ $t = 2.16$
Social functioning	86.3	20.3	82.3	17.3	$P = 0.25$ $t = 1.15$
Role emotional	82.9	32.3	80.6	28	$P = 0.68$ $t = 0.41$
Mental health	75.9	15.7	75.7	16	$P = 0.94$ $t = 0.07$
PCS	53	7.2	47.9	15.1	$P = 0.0003$ $t = 3.61$
MCS	50.1	9.6	50	13.3	$P = 0.95$ $t = 0.06$

Note: Population standards were derived from Canadian normative SF-36 data.[17]
Abbreviations: SD, standard deviation; PCS, physical component score; MCS, mental component score.

study participants with early schizophrenia were receiving stable doses of antipsychotic medication prior to study inclusion and were not considered actively psychotic. Significant improvements in QoL can be expected with initiation and maintenance of treatment with antipsychotic medication in early schizophrenia,[18] and in this context – ie, despite treatment – the QoL in our sample still remained well below population standards. Given the key role the concept of QoL plays in both short- and long-term outcomes of schizophrenia, we believe that the development of specific treatment interventions targeted at improving QoL as early as possible in the course of schizophrenia is indicated.[9]

To that end, we can report that sedentary behavior, more so than physical activity, was a key determinant of low QoL in early schizophrenia; it also related more strongly than physical activity to body fat content, confirmed in larger samples as a proxy marker of cardiovascular disease risk.[19,20] Here we corroborate the results of Vancampfort et al,[3] who found similar relationships in patients with chronic schizophrenia. Our findings suggest that a potential way to improve the physical component of QoL might be targeted reduction of sedentary behavior through substitution of inactivity with habitual physical activity. Employment was associated with better emotional functioning and could represent one avenue to reduce sedentary behavior; this might well result in additional benefits, such as improvements in the mental component of QoL. We would recommend that case managers and other clinicians provide more, and more frequent, activity-based interventions, such as walking groups to replace traditional groups in which participants sit for 45–50 minutes. Mental health facilities could establish collaborations with such diverse services as YMCA/YWCA, gyms, churches, and other agencies that may allow patients access to free or low-cost environments in which physical activity can be practiced, not only to improve QoL but also to reduce disablement.[21]

We also add, albeit indirectly, to the accumulating evidence that links obesity in schizophrenia with increased CVD risk.[22] Our results, together with previous observations of increased body fat content[5,23] and prevalent sedentary behavior[2] in schizophrenia, facilitate an unfavorable CVD risk factor constellation[24] that is already present early in the course of schizophrenia and can have considerable negative impact on health-related QoL, as well.[2] The CVD risk, emerging after relatively brief exposure to antipsychotic medication, warrants attention and suggests that more preventative action is required.[25,26]

Smoking emerged as important determinant of QoL, reducing physical functioning. Because smoking is highly prevalent in patients with schizophrenia, this may represent another important treatment target, with the potential both to reduce the CVD risk inherent to smoking and to improve QoL.

Conclusion

The potential to improve QOL, a key clinical outcome, may motivate patients with early schizophrenia to engage in physical activity, aimed at increasing habitual activity levels. Increased habitual physical activity replacing sedentary behavior would improve body composition and lead to a more favorable CVD risk profile.[27] Sedentary behaviors, such as watching television, idle sitting, reading, or using a computer, can be reduced by removing environmental and access barriers to physical activity[19] and by selecting subjectively enjoyable physical activities[28] or providing structured rehabilitative opportunities.[29] The study also highlights that the inverse relation between body weight and QoL, as previously determined in chronic schizophrenia samples,[4,30] is present early in the schizophrenia disease process and warrants the clinician's vigilance and rapid intervention to avert further deterioration of QoL (and increase in CVD risk) in later stages of schizophrenia. Ideally, a preventative framework incorporating targeted physical activity to replace sedentary behavior and perhaps smoking cessation as part of a structured lifestyle intervention would be desirable.[26]

Limitations

There are a number of limitations associated with this preliminary study. Due to funding constraints in a NARSAD Young Investigator Award, the number of first-episode patients enrolled was small, limiting generalizability of results; larger sample sizes are needed for firm conclusions, and our results may lead to conceptualization of larger follow-up protocols. The investigators were dependent on clinician referrals and agreement by patients to participate; thus, various unmeasured sampling biases might have affected the sample. For example, we had a smaller proportion of female subjects. With the provided funding, specific outreach to female patients was not feasible. Also, we did not formally assess symptoms of psychopathology. It is known that negative and depressive symptoms can increase sedentary behavior; it is possible, therefore, that among our study participants, such symptoms may have interfered with activities, worsening sedentary behavior, and with QoL. All our patients were clinically stable at time of enrollment, without significant medication changes

during the preceding 2 months, however, and a majority lived successfully in the community. Although the IPAQ has been validated against accelerometry in patients with schizophrenia,[16] we acknowledge the limitations of using a questionnaire to assess physical activity and sedentary behavior, as it may not cover short bursts of activity (less than 10 minutes). As a consequence, we may have underestimated physical activity. Funding constraints also precluded hiring a blinded rater.

Acknowledgments

The authors thank NARSAD for the funding supporting this study via a 2008 Young Investigator Award (80-216) to Dr Strassnig. Dr Ganguli is supported partially by a Tier 1 Canada Research Chair from the Canadian Institutes of Health Research. We wish to acknowledge that the Short Form 36 (SF-36) was developed at RAND as part of the Medical Outcomes Study. We also wish to acknowledge the support of the Centre of Excellence in Skeletal Health Assessment at the University of Toronto, Toronto Western Hospital, under the direction of Dr Angela Cheung.

Disclosure

The authors report no conflicts of interest in this work.

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