

Evaluation of Weight Gain and Metabolic Parameters among Adolescent Psychiatric Inpatients: Role of Health Promotion and Life Style Intervention Programs

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Abstract

Objective: The purpose of the current preliminary study was to estimate the nature and occurrence of metabolic abnormalities among adolescent inpatients receiving psychiatric treatment and to pilot a health promotion and life style intervention program.

Method: A total of 107 adolescents admitted over a 12-month period were evaluated for physical, clinical and metabolic parameters in two inpatient psychiatric units in Sydney, Australia, where a health promotion and life style intervention program was provided under the leadership of a Sports Psychologist.

Results: 46% of subjects were found to be "at risk for adverse health outcome" with one or more metabolic abnormalities and 4.6% qualified for a diagnosis of Metabolic Syndrome meeting 3 or more of the modified criteria for Metabolic Syndrome in young people. 13% of the sample was overweight with abnormal Body Mass Index (BMI). While two thirds recognized the importance of staying physically active, only a quarter were maintaining adequate level of physical activity. Regarding quality of life, only 30 to 40% reported good life and health satisfaction.

Conclusion: Our findings suggest that metabolic abnormalities are not uncommon among young psychiatric patients and that they are often missed. Regular monitoring for the presence of metabolic abnormalities and clinical risk factors should be part of the comprehensive management with special focus on preventative programs.

Keywords: Adolescents; Second generation antipsychotics; Metabolic syndrome; Health promotion; Life style intervention

Introduction

Young people with psychotic disorders and other psychiatric conditions necessitate treatment with antipsychotic medication [1,2] and prescription of Second Generation Antipsychotics (SGAs) has increased substantially among young patients [3]. However, up to 80% of patients treated with SGAs experience significant weight gain as a side effect of these medications [4]. Further, evidence suggests that the weight gain and related side effects of SGAs are greater in the young population than in adults [5,6]. In addition to the personal distress this causes to patients and their families, there are significant medical problems linked to such weight gain, including increased risk of type 2 diabetes, cardiovascular morbidity and Metabolic Syndrome (MS) [7].

Childhood obesity is reaching epidemic proportions worldwide and the adverse medical effects of obesity including MS and type 2 diabetes represent a serious public health concern [8,9]. Weight gain and obesity related complications account for some of the excess morbidity and mortality in patients with mental illness [10]. As these young people are simultaneously affected by the emotional distress and social impairment linked to their mental illness, specific, targeted interventions need to be developed and evaluated for this vulnerable population. Recent studies have also suggested the role of genetic factors in determining who is most likely to experience weight gain linked to taking anti-psychotic medication.

Available evidence from the literature suggests that childhood obesity tracks into adulthood [11] and that they are at risk for obesity related complications including dyslipidemia, atheroma, insulin resistance, systemic inflammation and oxidative stress [12]. Although

direct comparison across studies is difficult due to differences in the definition of the syndrome, it is estimated that 3 to 4% of adolescents have MS [13]. This risk is believed to be even greater for mentally ill young patients taking SGAs [14], which could interfere with their treatment adherence and recovery. Studies that have compared the effect of different SGAs on weight gain, obesity-related complications, and metabolic side effects in the young population [15-18] have highlighted the importance of monitoring for metabolic effects of SGAs in children and adolescents. Walter et al. [19] using a survey of Child Psychiatrists in Australia observed that, while concern regarding weight gain and metabolic side effects was high, the monitoring practices did not correspond to these concerns. In this regard Ellis et al. [20] described a novel program to facilitate monitoring of physical health and side effects in young patients treated with SGA. Furthermore, specialised treatment services for young patients have developed pilot programs for monitoring physical health status in first episode psychosis [21-22].

While weight gain and metabolic change induced by SGAs is

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		One or more Cook et al. [25] criteria positive	P Value
Total:	107		
Sex:			
Female	73.9%	49.3% (37/75)	0.224
Male	26.1%	63% (17/27)	
Age:			
10-12	3.7%	50% (2/4)	0.065
13-15	41%	63.7% (28/44)	
16-18	55%	52.5% (28/59)	
Ethnicity of Mother:			
White/Australian	66%	39.4%	0.177
Others		14.1%	
Ethnicity of Father:			
White/Australian	66%	40%	0.549
Others			
Subjects Medical History:	19%	14.7%	119
Yes			
On medication for Mental illness:			
Yes	71%	70.3%	0.500
On SGA	49.5%	54%	
Other medication	21.5%	34%	
Family History of diabetes:			
Yes	18%	58.8%	0.643
Family History of Hypertension:			
Yes	20.2%	61%	0.624
Family History of obesity:			
Yes	19.4%	38.9%	0.108
Living with:			
Both Parents	42.1%	46%	
Single parent	40%	61%	
Parents plus partner	10%	50%	
Others	5%	20%	
Institution	3%	100%	

Table 1: Demographic Characteristics of the sample.

thought to share the same pathophysiologic pathways [23], other studies have shown that these two effects are not always concurrent. Nonetheless, because weight gain is a leading pathway to metabolic syndrome, this risk needs to be monitored closely especially in children and adolescents receiving SGAs. Furthermore there is a need to develop youth friendly intervention strategies incorporating lifestyle interventions such as exercise programs and information on healthy living to prevent weight gain occurring, and to assist those who have gained excess weight to lose it and remain at healthy levels.

In this study clinical and metabolic parameters were evaluated in a group of adolescent inpatients who received a health promotion and life style intervention program as part of the comprehensive management during psychiatric admission.

Subjects and Methods

Adolescents aged 10-18 who were admitted to two inpatient mental health units in Sydney, Australia, over a 12 month period in 2009-2010 were assessed. A semi-structured questionnaire was used to gather sociodemographic variables such as age, gender, ethnicity, medical history, family medical history, clinical history including diagnosis and treatment history.

All patients were evaluated at baseline for physical parameters such as height, weight (in kg), and waist circumference. Blood pressure was ascertained on percentile using paediatric chart adjusted for age and

gender and Body Mass Index (BMI) was calculated using body mass index-for age percentiles based on gender as per the CDC criteria [9]. Metabolic parameters were obtained such as fasting blood sugar level, High Density Lipoprotein (HDL) cholesterol levels and Triglyceride (TG) levels. Data was collated and checked against the criteria for being "at risk for adverse health outcome" according to Correll et al. criteria [24] and for features of MS as per the National Cholesterol Education program's Adult Treatment Panel III Criteria modified by Cook for use in young people [25].

Along with the evaluation of the clinical and metabolic profile, the patients also completed questionnaires designed to ascertain their Quality of Life using World Health Organization Quality of Life (WHO-QOL) as well as their current attitudes and level of physical activity. Participants rated their level of physical activity, their confidence in overcoming things that can get in the way of doing regular physical activity, their belief about the importance and pros and cons of carrying out physical activity on a regular basis as well as their use of strategies to improve their level of activity. Physical activity change strategies were also ascertained and participants reported on their use of strategies to improve the level of physical activity such as obtaining information, putting reminders, changing the environment, keeping track of activity levels etc.

As part of the in-patient management, the patients participated in a Health Promotion and Lifestyle Intervention program run under the leadership of a Sports Psychologist. The program consisted of individual and group activities and the key components of the program were 1) Focus on Physical health and creative arts 2) Education and Dietary counselling 3) Psychological support. The Physical Health component focussed on Exercise group, Sports group, Gym and Adventure activities. The education component used discussion groups and provision of information on diet, exercise and healthy living. Psychological intervention included group sessions and individual counselling using motivational interviewing aimed at changing attitudes and beliefs to promote healthy lifestyle.

The association between sociodemographic factors (e.g. age, gender, ethnicity), personal factors (e.g. family background, family history), and clinical factors (e.g. diagnosis, treatment received) on weight gain and metabolic changes were evaluated using Chi square tests and significance levels were set at $p < 0.01$.

Results

Of the 107 patients admitted to the unit during the period of study, 73 were females. There were no significant differences in demographic characteristics between those with metabolic abnormalities and those without (Table 1). Seventy one percent were on medication for their mental illness, of which 50% were on SGAs at the time of evaluation. The duration of exposure to SGAs varied from two weeks to 6 months. Two out of the four subjects (50%) in the 10-12 age group, 28 out of the 44 (63.7%) in the 13-15 age groups and 28 out of the 59 (52.5%) in the 16-18 age group were found to be positive for one or more metabolic abnormalities. Based on the Correll criteria, 53% of subjects had 1 or more risk factors for Adverse Health Outcome. Table 2 describes the nature and occurrence of the metabolic abnormalities in the sample as per Cook criteria. 13.9% of the subjects were categorised as overweight; 35.2% were positive for hypertension; 22% were positive for high TG; 10.8% had abnormal HDL and 3% were positive for high blood sugar. Metabolic abnormalities were more common in males with 63% being positive for one or more of the metabolic abnormalities. 4.6% of the study population were positive for 3 or more criteria for metabolic syndrome as per Cook criteria, thus qualifying for a diagnosis of MS.

Metabolic abnormality	Cook Criteria Positive
Body Mass Index (BMI)	13.9%
Blood Pressure	35.2%
Triglycerides	22%
High Density Lipoprotein (HDL)	10.8%
Blood Glucose	3%
MS diagnosis (≥ three criteria positive):	4.6%
Three criteria positive	3.7%
Four criteria positive	0.9%

Table 2: Occurrence of metabolic abnormalities in the sample.

None of these metabolic abnormalities had been detected prior to the screening carried out as part of this project.

There was no association between being on SGAs and having MS ($X^2=1.387$; $p=0.500$). With regard to living arrangements, all three of those living in institutional setting were positive for one or more metabolic abnormalities. There was no association between having a metabolic abnormality in the patient and family history of diabetes ($X^2=0.884$; $p=0.643$); family history of obesity ($X^2=4.450$; $p=0.108$) and family history of hypertension ($X^2=0.944$; $p=0.642$).

With regards to the current level of physical activity, 19.7% reported doing physical activity for 60 minutes or more per day on 5 or more days of the week, while the percentage of young people who reported carrying out the same level of activity on 4, 3, 2, and 1 day per week were 9.8%, 18%, 14.8%, and 19.7% respectively (mean = 3.5; Standard Deviation = 1.9). Regarding future plans, 32.8% reported that in the next 6 months they intend to start doing 60 minutes or more of physical activity per day on 5 days or more per week. When asked about their attitudes and belief about how important physical activity was for them, 32% reported that they considered it as not important while 29% reported it was either moderately or extremely important. The pros and cons were rated on items such as “it will keep me fit”, or “it will take time away from friends”. There was no significant association between gender ($X^2 = 5.432$; $p=0.245$), BMI ($X^2 =4.11$; $p=0.391$), or metabolic abnormalities ($X^2 =4.495$; $p=0.343$), and the level of importance given to physical activity. On the physical activity confidence scale, the participants reported their confidence in being able to overcome things that can get in the way of doing physical activity such as setting aside time, being able to do it despite bad weather or during times of school projects etc. 30% reported that they do not feel confident that they can overcome such challenges, 30% reported that they feel confident that they can and the remaining 40% gave a neutral response. Again no significant associations were noted between the confidence level and gender ($X^2 =5.34$; $p=0.766$), BMI ($X^2 =1.156$; $p=0.561$), or metabolic abnormalities ($X^2 =2.842$; $p=0.242$). While 32.5% reported that they never used physical activity change strategies that would help them to improve the level of activity, 35.5% reported using these sometimes and 32% as often. There was no significant association between the use of physical activity change strategies and gender ($X^2 =2.743$; $p=0.254$), BMI ($X^2 =0.685$; $p=0.710$), or metabolic abnormalities ($X^2 =2.086$; $p=0.352$).

On the WHO-QOL, life satisfaction was reported as poor by 33%, average by 37.5% and good by 29.5%. Regarding health satisfaction, 39.5% each reported this to be poor or good while 21% reported average level of satisfaction.

Discussion

Our findings of at least one risk factor for adverse health outcome in 46% and MS in 4.6% highlight the importance of routine metabolic monitoring in adolescent psychiatric population. The rates were found to be higher in males and in the younger age group. The finding of no

association between exposure to SGAs and metabolic abnormalities coupled with the observation that 60% of our sample had been on SGAs for less than 6 months seem to suggest that those with mental illness per se are at increased risk of metabolic abnormalities, perhaps due to poor dietary habits, sedentary and unhealthy lifestyle maintained by the mentally ill. In this regard, Psychiatrists and primary care providers must be aware that, risk factors for psychiatric and metabolic disorders may cluster in young people just as it occurs in adults. Early identification of weight gain along with physical, clinical and metabolic abnormalities should take priority in the young mentally ill patients. In these situations, special attention should be given to the quantification of weight gain and obesity, as well as focus on life style intervention addressing diets and dietary patterns, physical activity, awareness and attitudes about healthy living. Emotional issues including anxiety and depression, as well as motivation for change should be addressed along with provision of appropriate psychological support and intervention. Techniques including motivational interviewing and health promotion strategies such as altering poor dietary habits and sedentary life style should be an integral part of management in these patients. Attention to psychological issues should also be a priority with promotion of stress management and better coping strategies as body image and self esteem are important to the adolescent population and low self esteem has been found to correlate with lack of motivation to be physically active [26]. The latter being a critical component of the modifiable variable in the management of obesity, instilling self worth and positive self perception in young people should be part of the comprehensive management of this vulnerable population [27].

Regarding management, a number of cognitive behavioural strategies have been found to be effective in helping individuals make lifestyle changes thus promoting patient satisfaction and physical well being [28-29]. Given the adverse effect of weight gain on compliance and relapse rates [30], as well as on social stigma and discrimination [31], evaluating the potential beneficial effects of preventative programs is of immense clinical importance. If not, physical changes due to weight gain may lead to poor body image and self-esteem and also result in non-adherence to treatment regimes. A recent systematic review and meta-analysis of randomised controlled trials of non-pharmacological management of antipsychotic induced weight gain in the adult population found that adjunctive non-pharmacological interventions were effective in attenuating antipsychotic-induced weight gain compared with treatment as usual, with treatment effects maintained over follow up [32]. We believe that the components of the health promotion program outlined here have several advantages especially for the newly diagnosed. It is hoped that introduction of such programs in routine clinical practice would prevent weight gain, improve compliance and overall well being and quality of life in children and adolescents with mental illness.

Limitations

While the current study achieved the aim of ascertaining the occurrence of metabolic abnormalities among adolescent psychiatric inpatients, due to the small sample size and the relatively short and variable duration of exposure to SGAs, it was not possible to determine any potential link between a particular drug and the occurrence of metabolic abnormalities. It is to be noted that around 60% of adolescents in this study were on second generation antipsychotic medication for less than 6 months and therefore the association between the two cannot be concluded. Further studies should clarify this by following up subjects from baseline prior to initiation of medication and then at regular intervals. Notwithstanding the fact that the data is limited due to the cross sectional nature of the assessment and intervention

program provided during their inpatient stay, this pilot study clarified beyond doubt the need for regular monitoring for physical health and metabolic parameters. Similarly, while the feasibility of including preventative programs as an integral part of the comprehensive inpatient management was established, follow up data is critical in evaluating the long term benefits of the program.

Conclusion

Our findings suggest that around half of adolescent patients receiving inpatient treatment for mental illness have one or more physical or metabolic abnormalities. However without routine monitoring they go unrecognized and are at risk for future adverse health outcomes. Given the clinical staging model where treatment effects are thought to be the greatest when provided early, preventive strategies would be most effective if these young people are targeted as early as possible. In this regard a recent systematic review highlighted the need for close screening and monitoring of metabolic side effects in young patients exposed to antipsychotics and good collaboration between child and adolescent psychiatrists, General Practitioners and Paediatricians to achieve this [33].

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