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Insight into illness in patients with schizophrenia: Associations with clinical symptoms, executive functions, and metabolic parameters

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Summary

Objective: *To evaluate the level of insight into illness in patients with schizophrenia and its associations with demographic factors, clinical symptoms, executive functions, and selected metabolic parameters.*

Subjects and Methods: *This cross-sectional study included 60 outpatients diagnosed with schizophrenia according to DSM-IV criteria. Participants were divided into two groups based on the median score of the Self-Appraisal of Illness Questionnaire (SAIQ): preserved insight (n=30) and impaired insight (n=30). Positive symptoms were assessed with the Positive Symptoms Rating Scale (PSRS), negative symptoms with the Brief Negative Symptom Assessment (BNSA), executive functions with the Wisconsin Card Sorting Test (WCST) and Wechsler-Bellevue Intelligence Scale-II (WB-II) subscales. Metabolic parameters included body mass index (BMI), systolic and diastolic blood pressure, and waist circumference. Statistical analysis was performed using t-tests, ANOVA, Pearson correlation, and multiple linear regression ($p<0.05$).*

Results: *Patients with impaired insight exhibited significantly higher positive (PSRS: 28.5±4.2 vs 18.3±3.1; $p<0.001$) and negative symptoms (BNSA: 35.2±5.6 vs 22.1±4.0; $p<0.001$), poorer executive performance (WCST total score: 45.6±8.9 vs 68.4±7.2; $p<0.001$), higher BMI (28.7±3.4 vs 24.5±2.8; $p<0.01$), and elevated blood pressure values. SAIQ total score negatively correlated with positive ($r=–0.62$; $p<0.001$) and negative symptoms ($r=–0.58$; $p<0.001$), illness duration ($r=–0.45$; $p<0.01$), and positively with years of education ($r=0.48$; $p<0.01$) and WCST score ($r=0.52$; $p<0.001$). Regression analysis showed that negative symptoms ($\beta=–0.41$; $p<0.001$) and executive dysfunction ($\beta=–0.35$; $p<0.01$) were the strongest independent predictors of poor insight ($R^2=0.62$).*

Conclusion: *Impaired insight in schizophrenia is strongly associated with greater psychopathological burden, neurocognitive deficits (especially executive dysfunction), and metabolic disturbances. These findings support the implementation of integrated therapeutic strategies targeting insight, cognition, and cardiometabolic health to improve long-term outcomes.*

Keywords: *schizophrenia, insight, executive functions, negative symptoms, metabolic syndrome, neurocognition*

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INTRODUCTION

Schizophrenia is a complex, heterogeneous psychiatric disorder characterized by a constellation of positive symptoms such as hallucinations and delusions, negative symptoms including avolition and blunted affect, disorganized thinking, and pervasive cognitive impairments that significantly affect social and occupational functioning (Tandon et al., 2009). The lifetime prevalence is approximately 0.7%, with a higher incidence in males and urban environments, influenced by genetic vulnerability (83% heritability) and environmental factors like prenatal complications and urban stressors (Tandon et al., 2009). Neurodevelopmental hypotheses suggest that early cerebral insults during gestation or perinatal periods disrupt neuronal migration and synaptic pruning, leading to symptom onset in late adolescence or early adulthood (Fatemi & Folsom, 2009). Neurotransmitter dysregulation, particularly in dopaminergic, glutamatergic, and GABAergic systems, underpins the pathophysiology, with dopamine D2 receptor hyperactivity linked to positive symptoms and prefrontal hypodopaminergia contributing to negative and cognitive deficits (Howes & Kapur, 2009).

Cognitive deficits, encompassing impairments in working memory, attention, processing speed, visual and verbal learning, as well as substantial deficits in reasoning, planning, abstract thinking, and problem-solving, are extensively documented and correlate with functional outcomes such as employment and independent living (Pregelj, 2019). Insight into illness, often termed "anosognosia" in psychiatric contexts, refers to the patient's awareness of their mental disorder, attribution of symptoms to the illness, recognition of treatment needs, and

acknowledgment of social consequences (David, 1990). Poor insight is a common characteristic of schizophrenia, presenting as a multidimensional construct with varying degrees and associations with psychotic severity, particularly evident in comparisons between first-episode psychosis and chronic stages, where it may contribute to reduced therapeutic alliance and compliance (Vuk Pisk et al., 2016). Impaired insight affects up to 50-80% of patients with schizophrenia and is associated with poor medication adherence, increased hospitalization rates, higher suicide risk, and diminished quality of life (Lincoln et al., 2007). Multidimensional models conceptualize insight deficits as arising from neuropsychological impairments (e.g., executive dysfunction), psychodynamic denial, or sociocultural stigma (Mintz et al., 2003). For instance, the metacognitive model posits that poor insight reflects deficits in self-monitoring and error detection, mediated by frontal-subcortical circuits (Raffard et al., 2009).

Epidemiological data indicate that insight is dynamic, improving with acute symptom remission but persisting in chronic phases, particularly linked to negative symptoms (Gerretsen et al., 2014). The trajectory of schizophrenia, marked by heterogeneous symptom progression from prodrome to chronic illness, underscores the need for longitudinal assessment to tailor interventions and mitigate worsening, with factors like duration of untreated psychosis influencing outcomes (Mihaljevic-Peles et al., 2023). Comorbid metabolic disturbances, including obesity, hypertension, and dyslipidemia, are prevalent in schizophrenia, with a 2-3-fold increased risk compared to the general population, exacerbated by second-generation antipsychotics (SGAs) like clozapine and olanzapine, which induce weight gain via histamine H1 and serotonin 5-HT2C receptor blockade (Newcomer, 2007). Schizophrenia is increasingly recognized as a systemic disorder with physical comorbidities such as metabolic syndrome contributing to reduced life expectancy and poorer overall health (Jaksic et al., 2018). These cardiometabolic risks contribute to a 10-25 year reduction in life expectancy, primarily from cardiovascular disease (Laursen et al., 2012). Poor insight may indirectly worsen metabolic outcomes by fostering non-adherence to lifestyle interventions or metabolic monitoring (Mohamed et al., 2009). This study aimed to investigate insight levels in stabilized schizophrenia outpatients and their correlations with demographics, psychopathology, executive functions, and metabolic parameters. Hypotheses posited that impaired insight would correlate with higher symptom severity, executive deficits, and metabolic abnormalities, potentially informing targeted interventions like cognitive behavioral therapy (CBT) for insight enhancement or integrated cardiometabolic care (Lysaker et al., 2009).

SUBJECTS AND METHODS

Study design and participants

This cross-sectional observational study was conducted at the Clinic for Psychiatry, University Clinical Center Tuzla, Bosnia and Herzegovina, from January 2012 to December 2014. A total of 60 adult outpatients (aged 18-65 years) meeting DSM-IV criteria for schizophrenia were consecutively recruited during routine follow-up visits. Diagnosis was confirmed via structured clinical interviews by board-certified psychiatrists. Inclusion criteria encompassed illness duration exceeding one year, clinical stability (no acute exacerbations or hospitalizations in the preceding six months), and ongoing antipsychotic pharmacotherapy (monotherapy or combination regimens, dose-equivalent to chlorpromazine 300-600 mg/day). Exclusion criteria included comorbid substance use disorders (per DSM-IV), intellectual disability (IQ <70), organic brain syndromes (e.g., dementia, epilepsy), severe medical conditions impacting cognition (e.g., uncontrolled diabetes, hepatic failure), or refusal of informed consent.

Participants were stratified into two equal groups (n=30 each) based on insight levels: preserved insight and impaired insight. Ethical approval was obtained from the Institutional Review Board of the University Clinical Center Tuzla, adhering to Helsinki Declaration principles. All patients provided written informed consent after detailed explanation of study procedures.

Instruments

Insight was quantified using the Self-Appraisal of Illness Questionnaire (SAIQ), a validated 17-item self-report instrument assessing three domains: awareness of illness, need for treatment, and worry about the illness (Marks et al., 2000). Items are rated on a 5-point Likert scale (1=strongly disagree to 5=strongly agree), yielding a total score ranging from 17 to 85, with higher scores indicating better insight. The SAIQ demonstrates good internal consistency (Cronbach's α=0.82-0.87) and convergent validity with clinician-rated insight scales like the Schedule for the Assessment of Insight (Sanz et al., 1998). In this study, the median SAIQ total score across the sample was 52.5 (interquartile range: 42-65). Patients scoring above the median were classified as having preserved insight, while those below or equal were deemed to have impaired insight.

Positive symptoms were evaluated with the Positive Symptoms Rating Scale (PSRS), a clinician-administered

Table 1. Demographic and clinical characteristics of the sample (n=60)

Variable	Total (n=60)	Preserved insight (n=30)	Impaired insight (n=30)	p-value
Age (years)	42.3 ± 10.5	40.8 ± 9.2	43.8 ± 11.6	0.21
Male sex (%)	55	50	60	0.32
Education (years)	11.2 ± 3.1	12.5 ± 2.8	9.9 ± 3.0	<0.01
Illness duration (years)	12.4 ± 6.8	10.2 ± 5.4	14.6 ± 7.5	<0.05
Number of hospitalizations	4.1 ± 2.3	3.2 ± 1.8	5.0 ± 2.5	<0.01

tool rating delusions, hallucinations, and disorganized thought on a 0-6 severity scale (total range: 0-42) (Opler et al., 2006). Negative symptoms were assessed via the Brief Negative Symptom Assessment (BNSA), focusing on blunted affect, emotional withdrawal, motor retardation, and avolition (total range: 0-48) (Kirkpatrick et al., 1989). Executive functions were probed using the Wisconsin Card Sorting Test (WCST), measuring cognitive flexibility through perseverative errors, categories completed, and total score (higher scores reflect better performance) (Heaton et al., 1993), supplemented by Wechsler-Bellevue Intelligence Scale-II (WB-II) subscales for similarities (abstract reasoning) and arithmetic (working memory) (Lezak et al., 2012).

Metabolic parameters encompassed body mass index (BMI, kg/m²), systolic and diastolic blood pressure (mmHg, averaged from three seated measurements), and waist circumference (cm). Demographic and clinical data were gathered via semi-structured interviews and medical records review.

Statistical analysis

Data analysis was performed using SPSS version 20.0. Normality was verified with Kolmogorov-Smirnov tests. Group differences were examined with independent samples t-tests and chi-square tests. Associations were assessed via Pearson's correlation coefficients. Multiple linear regression modeled predictors of SAIQ total score, incorporating variables with significant univariate correlations, adjusted for age and gender. Significance was set at two-tailed $p<0.05$.

RESULTS

The sample comprised 60 patients (mean age 42.3±10.5 years; 55% male) with a mean illness duration of 12.4±6.8 years and 4.1±2.3 prior hospitalizations. Education averaged 11.2±3.1 years, with 45% unemployed and 60% unmarried. No significant differences emerged in age or gender between insight groups ($p>0.05$), but the impaired insight group had lower education (9.9±3.0 vs 12.5±2.8 years; $p<0.01$), longer illness duration (14.6±7.5 vs 10.2±5.4 years; $p<0.05$), and more hospitalizations (5.0±2.5 vs 3.2±1.8; $p<0.01$) (Table 1).

Patients with impaired insight had significantly worse scores on all symptoms and neurocognitive measures (Tables 2 and 3).

Metabolic profiles revealed elevated BMI (28.7±3.4 vs 24.5±2.8 kg/m²; $t=5.1$, $p< 0.01$), systolic blood pressure (135.6±12.5 vs 120.4±10.2 mmHg; $t=5.3$, $p<0.001$),

Table 2. Comparison of symptom severity by insight group

Scale	Preserved insight	Impaired insight	p-value
PSRS (positive symptoms)	18.3 ± 3.1	28.5 ± 4.2	<0.001
BNSA (negative symptoms)	22.1 ± 4.0	35.2 ± 5.6	<0.001

Table 3. Executive function performance by insight group

Measure	Preserved insight	Impaired insight	p-value
WCST total score	68.4 ± 7.2	45.6 ± 8.9	<0.001
WB-II Similarities	15.2 ± 2.1	10.8 ± 1.9	<0.001
WB-II Arithmetic	12.5 ± 1.8	8.7 ± 2.0	<0.001

Table 4. Metabolic parameters by insight group

Parameter	Preserved insight	Impaired insight	p-value
BMI (kg/m²)	24.5 ± 2.8	28.7 ± 3.4	<0.01
Systolic BP (mmHg)	120.4 ± 10.2	135.6 ± 12.5	<0.001
Diastolic BP (mmHg)	78.3 ± 8.1	88.9 ± 9.3	<0.001
Waist circumference (cm)	92.1 ± 7.6	102.4 ± 8.2	<0.01

and waist circumference (102.4±8.2 vs 92.1±7.6 cm; t=4.7, p<0.01) in the impaired insight cohort (Table 4).

Correlational analyses indicated that SAIQ total score negatively correlated with positive symptoms (r=–0.62, p<0.001), negative symptoms (r=–0.58, p<0.001), illness duration (r=–0.45, p<0.01), and number of hospitalizations (r=–0.42, p<0.01). Positive correlations were observed with education years (r=0.48, p<0.01) and WCST total score (r=0.52, p<0.001). BMI showed a moderate negative correlation with SAIQ (r=–0.39, p<0.01).

Multiple linear regression analysis, with SAIQ as the dependent variable, yielded a significant model $F(6,53)=14.2$, $p<0.001$; adjusted $R^2=0.62$). Independent predictors included negative symptoms (β=–0.41, t=–4.5, p<0.001), WCST total score (β=0.35, t=3.8, p<0.01), and education (β=0.28, t=3.1, p<0.01), while positive symptoms, illness duration, and BMI did not retain significance after adjustment.

DISCUSSION

The current investigation elucidates the multifaceted associations between insight into illness and key clinical, neurocognitive, and metabolic domains in schizophrenia, aligning with established literature while extending findings to a Bosnian-Herzegovinian cohort (Softic & Sutovic, 2007). Impaired insight was robustly linked to elevated positive and negative symptomatology, corroborating evidence that anosognosia correlates with acute psychotic features and enduring negative deficits (Amador et al., 1994; Vuk Pisk et al., 2016). Positive symptoms may distort reality appraisal, whereas negative symptoms impair motivation for self-reflection (Quee et al., 2011). Notably, negative symptoms emerged as the strongest predictor, consistent with studies reporting that blunted affect and amotivation account for 30-40% of insight variance (Lincoln et al., 2007). The heterogeneous trajectory of schizophrenia, with variable symptom progression and potential worsening if untreated, further highlights how persistent negative symptoms and poor insight may exacerbate long-term outcomes (Mihaljevic-Peles et al., 2023). Executive dysfunction, particularly on WCST, was markedly worse in low-insight patients, supporting models linking frontal lobe impairments to poor insight (Shad et al., 2004; Raffard et al., 2009). These findings align with overviews of cognitive deficits in schizophrenia, where executive impairments in reasoning, planning, and problem-solving are prevalent and interfere with rehabilitation (Pregelj, 2019). Metabolic findings were more pronounced in the impaired group, echoing increased cardiometabolic risk in schizophrenia (Newcomer, 2007; Jaksic et al., 2018). Limitations include cross-sectional design and sample size; future longitudinal studies are recommended (Raij et al., 2012). Clinically, these findings advocate routine insight evaluation and tailored interventions: metacognitive training for executive enhancement (Moritz & Woodward, 2007), motivational interviewing for negative symptoms, and multidisciplinary cardiometabolic management. Enhancing insight could yield downstream benefits in functional recovery.

CONCLUSION

Impaired insight in schizophrenia is intricately associated with heightened psychopathology, executive impairments, and metabolic comorbidities. By identifying negative symptoms and executive dysfunction as key predictors, this study underscores the imperative for holistic, insight-oriented therapies to foster better adherence, cognitive resilience, and cardiometabolic health, ultimately ameliorating long-term prognosis.

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