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Constitutional and Morphological Predisposition to Suicidal Behavior in Schizophrenia

Kornetov A.N., Galkin S.A., Mednova I.A., Petkun D.A., Kornetova E.G.

*Mental Health Research Institute, Tomsk National Research Medical Center (NRMCC), Russian Academy of Sciences
4 Aleutskaya St., 634014 Tomsk, Russian Federation*

ABSTRACT

Aim. To study the relationship of constitutional and morphological features of patients with schizophrenia with suicidal behavior.

Materials and methods. We examined 215 patients with schizophrenia. Information about the age of the patients, the age of manifestation and duration of the disease, and the history of suicide attempts was acquired through structured clinical interviews and examination of medical records. Additionally, the Beck Hopelessness Inventory was used. The anthropometric examination was carried out according to V.V. Bunak's method, modified by V.P. Chitetsov. Constitutional and morphological body types and somatic sexual differentiation were determined based on the calculation of the Rees – Eysenck index and the Tanner index.

Results. The χ^2 test revealed significant differences in the distribution frequencies of the main constitutional and morphological types between the groups of patients with and without suicide attempts ($p = 0.033$). Following a pairwise comparison, significant differences were found only in the frequency of asthenic constitutional and morphological type ($p = 0.018$). Also, when comparing the frequencies of the distribution of constitutional and morphological types between patients with and without hopelessness, significant differences were found ($p = 0.035$). In the group of patients with hopelessness, the asthenic constitutional and morphological type prevailed ($p = 0.045$). The network analysis made it possible to identify two independent suicide risk factors in patients with schizophrenia: clinical and anthropometric.

Conclusion. The results of the study clearly confirm the importance of the constitution as an independent risk factor for suicidal behavior in patients with schizophrenia. The data obtained open up prospects for early detection of predisposition to suicidal thoughts and actions in this group of patients.

Keywords: schizophrenia, suicidal risk, parasuicide, hopelessness, constitution, anthropometry, Rees – Eysenck index, Tanner index

Conflict of interest. The authors declare the absence of obvious or potential conflicts of interest related to the publication of this article.

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Conformity with the principles of ethics. All patients signed an informed consent to participate in the study. The study was approved by the local Ethics Committee at Mental Health Research Institute, Tomsk NMRC (Minutes No. 185 dated 16.06.2025).

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Конституционально-морфологическая predisпозиция суицидального поведения при шизофрении

Корнетов А.Н., Галкин С.А., Меднова И.А., Петкун Д.А., Корнетова Е.Г.

Научно-исследовательский институт (НИИ) психического здоровья
Томского национального исследовательского медицинского центра (НИМЦ) Российской академии наук
Россия, 634014, г. Томск, ул. Алеутская, 4

РЕЗЮМЕ

Цель. Изучить связь конституционально-морфологических особенностей больных шизофренией с суицидальным поведением.

Материалы и методы. Обследовано 215 пациентов с диагнозом шизофрении. Возраст пациентов, возраст манифестации и продолжительность заболевания, история суицидальных попыток были получены путем структурированного клинического интервью и изучения медицинских карт. Дополнительно использовалась Шкала безнадежности Бека (Beck Hopelessness Inventory). Антропометрическое обследование проводилось по методике В.В. Бунака в модификации В.П. Чтецова. Конституционно-морфологические типы телосложения и соматическая половая дифференциация определялись на основании расчета индекса Rees-Eysenk и индекса Tanner.

Результаты. По критерию χ^2 были обнаружены статистически значимые различия частот распределения основных конституционально-морфологических типов между группами пациентов с суицидальными попытками и без ($p = 0,033$). При попарном сравнении значимые различия были выявлены только по частоте встречаемости астенического конституционально-морфологического типа ($p = 0,018$). Также при сравнении частот распределения конституционально-морфологических типов между пациентами с наличием и отсутствием безнадежности обнаружены статистически значимые различия ($p = 0,035$), в группе пациентов с безнадежностью преобладал астенический конституционально-морфологический тип ($p = 0,045$). Проведенный сетевой анализ позволил выделить два независимых друг от друга фактора суицидального риска у пациентов с шизофренией: клинический и антропометрический.

Заключение. Результаты исследования наглядно подтверждают значимость конституции в качестве независимого фактора риска суицидального поведения у пациентов с шизофренией. Полученные данные открывают перспективы для раннего выявления предрасположенности к суицидальным мыслям и действиям у данной группы больных.

Ключевые слова: шизофрения, суицидальный риск, парасуицид, безнадежность, конституция, антропометрия, индекс Rees-Eysenk, индекс Tanner

Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

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INTRODUCTION

According to the World Health Organization (WHO), approximately 800,000 people die by suicide each year globally, with suicide attempts estimated to be 20 times more frequent [1, 2]. Mental

disorders are a leading cause of suicidal behavior [3, 4]. Among individuals with schizophrenia, the lifetime risk of suicide death is approximately 5%, while the likelihood of a suicide attempt ranges from 25 to 50% [5, 6]. A literature search in the PubMed database using the keywords “schizophrenia” and

“suicide” indicates that scholarly publications on this topic have increased 3.5-fold over the past two decades. This growing attention is warranted, as suicide remains a leading cause of premature mortality in patients with mental disorders [7].

Retrospective studies reveal that schizophrenia is diagnosed in 8.8 to 15.4% of psychiatric patients hospitalized following a suicide attempt [8, 9]. In outpatient settings, however, the proportion of individuals with schizophrenia who have attempted suicide is significantly higher, reaching 55.6% [10, 11]. Key risk factors for this population include a family history of mental illness, suicide among relatives, feelings of loneliness, and alcohol abuse [11].

Currently, the primary focus of research lies in identifying various biological markers of suicide risk in schizophrenia [12–15]. However, despite significant progress in studying the genetic and neurobiological foundations of schizophrenia and suicidal behavior, as well as in investigating the clinical aspects of these conditions, a notable gap remains in the analysis of a patient biotype. The biotype encompasses parameters such as phenotypic traits, morphophenotypic characteristics, and constitutional type, which serves as a structural biomarker of body reactivity that remains largely stable throughout adulthood. In healthy individuals, it is linked to the functional state of organs and systems [16]. In individuals with various pathologies, reactivity influences the nature of the illness.

The most detailed and comprehensive research in this area has been conducted on schizophrenia. Based on the obtained data, N.A. Kornetov, in his works from 1989 and 2008, formulated an anthropological paradigm that revised previous notions about the role of constitutional predisposition to certain diseases [17, 18]. This paradigm demonstrated that constitutional features influence not so much the likelihood of developing a particular pathology, but rather its course and outcome. This approach has opened new prospects for forecasting the pathokinesis of diseases and developing more personalized treatment methods.

The aim of the study was to establish the relationship between the constitutional and morphological status of patients with schizophrenia and suicidal behavior.

MATERIALS AND METHODS

The study was carried out at two clinical sites: the Department of Endogenous Disorders at the Clinic of Mental Health Research Institute, Tomsk NRMC and Tomsk Clinical Psychiatric Hospital. The study sample comprised 215 patients (121 men (56.3%) and 94 women (43.7%)) with a verified diagnosis of schizophrenia (F20 in the ICD-10), confirmed through a clinical interview by an expert psychiatrist from the research team.

Inclusion criteria:

- diagnosis of schizophrenia according to ICD-10 criteria (F20);
- age between 18 and 50 years (inclusive);
- absence of congenital or acquired skeletal disorders;
- absence of organic disorders, including symptomatic mental disorders;
- absence of neurological diseases;
- absence of severe somatic-symptom disorders leading to organ or system failure (including conditions directly related to prior suicide attempts).

Exclusion criteria:

- dependence on psychoactive substances (with the exception of tobacco dependence, which is highly prevalent in this population in Russia [19]);
- use of clozapine within the six months prior to enrollment in the study, due to its demonstrated effect on reducing suicidal behavior [20].

Data on patient age, age of onset, duration of the mental disorder, and history of suicide attempts were collected from medical records and a structured clinical interview.

The severity of symptoms was assessed using the Positive and Negative Syndrome Scale (PANSS) [21]. As all participants were native Russian speakers, the Russian version of the Structured Clinical Interview for PANSS (SCI-PANSS), adapted for use in Russia by S.N. Mosolov [22], was applied. Suicide risk was evaluated using the Beck Hopelessness Inventory (BHI) [23], which demonstrates high sensitivity and specificity in assessing suicide risk in patients with schizophrenia [24, 25]. Consequently, we employed the original 20-item version of the scale [23]. Its Russian adaptation, originally developed by A.A. Gorbakov [26], was derived from an earlier version [27] and was used in this study.

An anthropometric examination was performed by measuring height as well as transverse, biacromial,

and bicristal chest diameters using the modified V.P. Chtetsov method [28]. Measurements were taken using a medical stadiometer and a large sliding caliper. Constitutional and morphological types and somatic sexual differentiation were determined using the Rees – Eysenck index and Tanner index, respectively. Reference ranges for these indices were established based on data from a comparison group of 100 healthy volunteers, matched to the study group by sex and age. The cutoff values were defined as follows. The hypersthenic constitutional and morphological type had values < 95.1 in men and < 96.8 in women, mesosthenic – $95.1–105.7$ in men and $96.8–110.8$ in women, asthenic – > 105.7 in men and > 110.8 in women. For gynecomorphic somatic sexual differentiation, the values were < 87 in men and < 75 in women, for mesomorphic – $87–93.5$ in men and $75–81$ in women, for andromorphic – > 93.5 in men and > 81 in women.

Statistical data processing was performed using Statistica 12 (Copyright© StatSoft, Inc. 1984-2014) and the R 4.5.2 software packages. All obtained variables were presented in absolute (n) and relative (%) units. Frequency analysis was performed using the χ^2 test. The Statnet R package was used for network analysis.

RESULTS

Of the entire patient sample, 70 individuals had suicide attempts (parasuicides), which constituted 32.6%. A comparative analysis of the frequencies of distribution of constitutional and morphological types between patients with and without a history of suicidal behavior is presented in Table 1.

Table 1

Comparison of the Distribution Frequencies of Constitutional and Morphological Types in Patient Subgroups, n (%)			
Constitutional and morphological type	Patients with parasuicides	Patients without parasuicides	p
Asthenic	34 (48.6)	45 (31)	0.018**
Mesosthenic	29 (41.4)	74 (51)	0.239**
Hypersthenic	7 (10)	26 (18)	0.190**
Total	70 (100)	145 (100)	0.033*

Here and in Tables 2–4: * results of the χ^2 test; ** results of the pairwise comparison.

The χ^2 test revealed significant differences in the distribution frequencies of the main constitutional and morphological types between the patient groups

($p = 0.033$). The pairwise comparison revealed significant differences only in the frequency of the asthenic body type ($p = 0.018$).

Comparison of the distribution of somatic sexual differentiation types between the subgroups (Table 2) did not reveal any significant differences ($p = 0.581$), nor did pairwise comparison of these parameters ($p > 0.05$).

Table 2

Comparison of the Distribution Frequencies of Different Types of Somatic Sexual Differentiation in Patient Subgroups, n (%)			
Type of somatic sexual differentiation	Patients with parasuicides	Patients without parasuicides	p
Andromorphic	24 (34.3)	53 (36.6)	0.862**
Mesomorphic	25 (35.7)	58 (40)	0.648**
Gynecomorphic	21 (30)	34 (23.4)	0.387**
Total	70 (100)	145 (100)	0.581*

Hopelessness, i.e., the degree of a person's negative attitude toward their own future, is used as an indirect marker of a suicide risk. Therefore, the level of hopelessness in the study group of patients with schizophrenia was analyzed. Most patients reported mild (41.4%) or no (35.8%) hopelessness, while moderate (16.2%) and severe (6.6%) conditions were significantly less common. When comparing the frequencies of body type distribution among the patients depending on the presence and absence of hopelessness (Table 3), statistically significant differences were revealed ($p = 0.035$).

Table 3

Comparison of the Distribution Frequencies of Constitutional and Morphological Types between Patient Subgroups with and without Hopelessness, n (%)			
Constitutional and morphological type	Hopelessness		p
	Presence	Absence	
Asthenic	58 (42)	21 (27.3)	0.045**
Mesosthenic	64 (46.4)	39 (50.6)	0.646**
Hypersthenic	16 (11.6)	17 (22.1)	0.064**
Total	138 (100)	77 (100)	0.035*

The pairwise comparison of the resulting groups revealed significant differences for the asthenic constitutional and morphological type ($p = 0.045$).

Similarly, the frequencies of the distribution of somatic sexual differentiation types in patients were compared based on the presence or absence of hopelessness. The comparison revealed no significant differences ($p > 0.05$) (Table 4).

Table 4

Comparison of the Distribution Frequencies of Somatic Sexual Differentiation Types Depending on the Presence and Absence of Hopelessness, *n* (%)

Type of somatic sexual differentiation	Hopelessness		<i>p</i>
	Presence	Absence	
Andromorphic	54 (39.1)	23 (29.9)	0.226**
Mesomorphic	48 (34.8)	35 (45.4)	0.163**
Gynecomorphic	36 (26.1)	19 (24.7)	0.948**
Total	138 (100)	77 (100)	0.261*

Next, a graph (network model) of suicide risk was constructed for the patients included in the study. Two groups of parameters (clinical and anthropometric) served as nodes in the network model. Statistically significant ($p > 0.05$) correlations identified served as edges (Figure).

The resulting network model contained 8 nodes and 11 undirected edges. The network analysis also allowed to identify two independent factors (clusters) of suicide risk in schizophrenia.

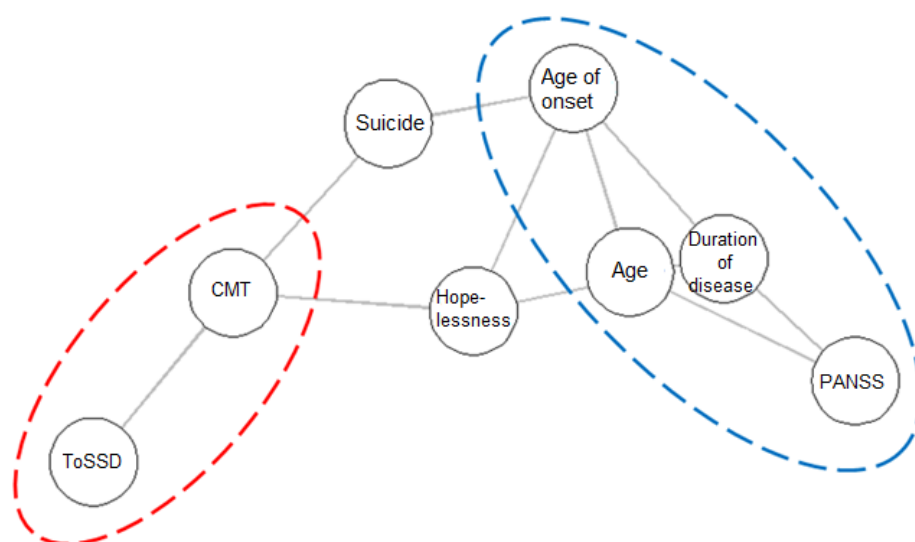


Figure. Network model of a suicide risk in schizophrenia. CMT – constitutional and morphological type; ToSSD – type of somatic sexual differentiation.

DISCUSSION

The incidence of documented suicide attempts in the studied sample of patients with schizophrenia was 32.6%. This rate aligns with findings from a number of other studies [3–6] and reflects the average trend observed in this patient population. The high frequency of suicide attempts among individuals with schizophrenia represents a serious challenge, necessitating a comprehensive approach to treatment and rehabilitation. It is crucial to address not only the management of psychotic symptoms but also the treatment of comorbid conditions, such as depression, anxiety, and substance use disorders, as these can significantly elevate suicide risk [11].

In addition to retrospective data, the study included an observational component in a cross-sectional design. Hopelessness was analyzed as a potential risk factor for suicidal behavior, revealing relatively high prevalence among patients with schizophrenia: 64.2% of patients exhibited varying degrees of hopelessness. Hopelessness, as a hallmark of depressive symptom severity,

significantly impacts a patient's understanding of mental illness, its consequences, and recognition of a need for treatment and adherence to medical recommendations [26, 29].

Previously, our research group has presented data on somatomorphological predictors of negative symptom development in schizophrenia [30, 31], as well as on the adverse effects of antipsychotic therapy [32, 33]. However, the role of anthropometric characteristics in suicidal behavior has remained unclear. The significant overrepresentation of the asthenic constitutional and morphological type identified in the present study (both among patients with parasuicide and those with high hopelessness values) raises the question of whether constitutional and morphological predisposition to suicidal behavior in schizophrenia should be delineated.

Given two key dimensions of suicidal behavior (a history of parasuicide and current hopelessness), we performed a network analysis to model suicide risk in schizophrenia. The resulting network delineated two distinct and independent clusters central to shaping

this risk. The first cluster encompasses clinical characteristics related to disease development, progression, and the severity of psychopathological symptoms. The second, anthropometric cluster is defined by constitutional physical parameters that may predispose individuals to suicidal ideations. This integrative approach allows for a comprehensive assessment of inter-variable relationships and facilitates the development of more targeted strategies for suicide risk prevention at early stages of schizophrenia.

CONCLUSION

The study results confirm the significance of the constitutional status as an independent risk factor for suicidal behavior in patients with schizophrenia. These findings offer potential for early identification of suicidal ideations in this patient group, which could, in turn, significantly reduce the adverse outcomes of schizophrenia and facilitate the development of tailored approaches to psychological counseling, psychotherapy, and rehabilitation.

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Author Contribution

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Author Information

Kornetov Alexander N. – Dr. Sci. (Med.), Leading Researcher, Department of Affective States, Mental Health Research Institute, Tomsk NRMC of RAS, Tomsk, alkornetov@gmail.com, <http://orcid.org/0000-0002-2342-7504>

Galkin Stanislav A. – Cand. Sci. (Med.), Senior Researcher, Department of Addictive Disorders, Mental Health Research Institute, Tomsk NRMC of RAS, Tomsk, s01091994@yandex.ru, <http://orcid.org/0000-0002-7709-3917>

Mednova Irina A. – Cand. Sci. (Med.), Researcher, Mental Health Research Institute, Tomsk NRMC of RAS, Tomsk, irinka145@yandex.ru, <http://orcid.org/0000-0002-8057-3305>

Petkun Dmitry A. – Psychiatrist, Researcher, Department of Endogenous Disorders, Mental Health Research Institute, Tomsk NRMC of RAS, Tomsk, substantia_p@mail.ru, <http://orcid.org/0009-0008-1878-5084>

Kornetova Elena G. – Dr. Sci. (Med.), Head of the Department of Endogenous Disorders, Mental Health Research Institute, Tomsk NRMC of RAS, Tomsk, ekornetova@outlook.com, <http://orcid.org/0000-0002-5179-9727>

(✉) **Kornetov Alexander N.**, alkornetov@gmail.com

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