Improvement of Activities of Daily Living in Eight Schizophrenia Subtypes Based on Six Therapy Methods: A Pilot Study Based on a Hospital Medical Record Analysis

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Abstract

Background: The activities of daily living (ADL) in schizophrenia patients were always a focus of attention. This study aimed to assess the changes of proportions of different schizophrenia subtypes with time in different subgroups and the improvement of ADL of patients with schizophrenia subtypes using different therapy methods and its related factors.

Methods: All the data were extracted from one biggest professional psychiatric hospital in Beijing of China. All the medical records from all the subjects with confirmed schizophrenia diagnosis from 2005 to 2015 in this study. ADL index was evaluated based on the Barthel ADL Questionnaire. Multiple linear regression models were used to explore the influencing factors of the improvement of ADL index.

Results: A total of 12,995 subjects age from 9 to 90 years were included in this study. A bimodal distribution with ages for the overall schizophrenia types and therapeutic methods that there were two peaks of age groups, 20-30 years and 50-60 years, with relatively larger number of cases. It was mainly driven by the unmarried status. Undifferentiated schizophrenia, paranoid schizophrenia and residual schizophrenia accounted for the most causes, but residual schizophrenia was specifically distributed in the high age groups from 50 to 80 years. Electroconvulsive therapy was mainly used in young subjects, but antipsychotic medication therapy and Moritatherapy were mainly used old subjects. Other three therapy methods were evenly used among all age groups. Paranoid schizophrenia and undifferentiated schizophrenia presented statistically significant improvement of ADL index, particularly using the electroconvulsive therapy, followed by group psychotherapy, recreation therapy, behavior modification therapy, Moritatherapy and antipsychotic medication in turn. Patients of males, combining with old ages and unmarried status, tend not to get higher and better improvements of ADL index, particularly for those with nervous schizophrenia, youth schizophrenia, simple schizophrenia and undifferentiated schizophrenia.

Conclusions: An age-specific characteristic existed in the proportions of schizophrenia subtypes therapy methods. The improved quality of life of schizophrenia patients need to be strengthened targeting at the priority population with high risk factors and optimized therapeutic methods.

Keywords: Schizophrenia; Activities of daily living; Therapy methods; China

Background

Schizophrenia (SCZ) is a severe, lifelong mental disorder affecting around 1% of the world's population.[1,2] It was characterized by complex, heterogeneous behavioral and cognitive syndromes such as hallucinations, delusions, disorganized communication, poor planning, reduced motivation, and blunted affect, whose origins appear to lie in genetic and/or environmental disruption of brain development.[2] While the incidence of the SCZ is relatively low,[3] the condition is one of the major contributors to the global burden of disease.[1]

The activities of daily living (ADL) in SCZ patients were always a focus of attention. ADL refer to the essential activities an individual is required to perform to live independently within society.[4] ADL of SCZ patients involved personal care activities such as feeding, toileting, washing, and dressing, as well as instrumental ADL which referred to extended tasks such as meal preparation, using public transportation, doing household chores, and grocery shopping.[5] Thus, ADL was important to SCZ patients in their daily life. SCZ occurs worldwide, and for decades it was generally believed to have a uniform lifetime morbid risk of 1% across time, geography, and gender.[2] This implied that the life status of the patients during treatment is worth exploring to provide better evidence for the improvement of the patient's quality of life.

To our knowledge, however, limited are the researches about comprehensive evaluation of epidemiological characteristics' changes of different SCZ subtypes, nor the evaluation of improvement of ADL, and its related impact factors, of SCZ patients with different subtypes after using different therapy methods. Thus, this study used the 10-years medical records based on one of biggest professional psychiatric hospital in China with from 2005 to 2015. The objectives of our study were to (1) assess the changes of proportions of different SCZ subtypes with age in different subgroups; and (2) estimate the improvement of ADL of patients with SCZ subtypes using different therapy methods and its related factors.

Method

Study Design and Participants

All the data were extracted from one biggest professional psychiatric hospital in Beijing of China after concealing personal privacy information under the permission of Medical Research Ethics Committee of Huilongguan Hospital. We collected the medical records from all the subjects with confirmed SCZ diagnosis from 2005 to 2015 in this study. After cleaning up the data, a total of 12995 subjects age from 9 to 90 years were included in this study. We excluded the subjects with unclear diagnosis, other types of mental psychosis, and those with large amount of missing data. The studies were approved by the Medical Research Ethics Committee of the Beijing HuiLongGuan Hospital (HLG2017-44). Informed consent was obtained from all the patients.

Data Collection

All the needed data from medical records of all the subjects with confirmed SCZ diagnosis were extracted from the hospital record system. We selected the information of variables of the subjects including gender, age, marriage status, occupations, ethnicity, SCZ subtypes, therapeutic methods, and viability scores at prior treatment and after treatment based on the unified questionnaires.

Definition and Measures

The SCZ must be diagnosed based on the International Classification of Diseases (ICD-F20). A total of eight subtypes were determined from the medical records of all the subjects based on ICD standards, including undifferentiated SCZ (F20.301), paranoid SCZ (F20.001), youth SCZ (F20.101), nervous SCZ (F20.201), post-schizophrenic depression (F20.401), residual SCZ (F20.501), simple SCZ (F20.601) and SCZ (F20.901). A total of six therapeutic methods were determined based on the medical records including electroconvulsive therapy, recreation therapy, group psychotherapy, antipsychotic medication, Moritatherapy and behavior modification therapy. Viability scores of ADL were evaluated based on the Barthel ADL Questionnaire, which is a widely used and most studied ADL evaluation method. It is mainly used to detect the changes in the patients' independent living ability before and after treatment. It is suitable for the subjects with SCZ in hospital.[6]

Statistical Analysis

Descriptive statistics on the general characteristics of the study population as well as the frequency of different marriage status, occupations, ethnicity, SCZ subtypes, and therapeutic methods were reported. Stacked plot was used to evaluate the changes of proportions of different SCZ subtypes and therapeutic methods with ages in both sexes and different marriage status. T-test was performed to test the differences of ADL index between prior treatment and after treatment. Multiple linear regression models were used to explore the influencing factors of the improvement of ADL index. All analyses were performed using Stata 12.0 software. Two-sided P values < 0.05 were considered significant.

RESULTS

The Characteristic of the Study Sample

As shown in **Table 1**, a total of 129,95 cases were included in this study. The median age was 48 with range from 9 to 90 years. The proportions between males and females were 55.0%a and 45.0%; and the proportions among different marriage status were 51.2% for the unmarried, 27.1% for the married, 5.0% for the widowed and 16.7% for the divorce; and Han ethnicity accounted for the most cases to 97.4% followed by Hui (1.6%), Mongols (0.5%), Man (0.3%) and others (0.3%); and the occupations of all the cases mainly were the retired (34.5%), the unemployed (30.5%), and professional and technical personnel (19.1%). As for the different SCZ types, the proportions were undifferentiated-SCZ (57.5%), paranoid SCZ (34.9%), residual SCZ (6.4%), SCZ (0.4%), post-SCZ depression (0.3%), nervous SCZ (0.2%), youth SCZ (0.2%) and simple SCZ (0.1%), separately. As for the different therapeutic methods, the proportions were electroconvulsive therapy (10.2%), recreation therapy (16.9%), group psychotherapy (12.3%), antipsychotic medication (15.7%), Moritatherapy (25.9%) and behavior modification therapy (19.0%).

Table 1. *Basic demographic characteristics*

Variables	Groups	Number	Proportions
Age*		48.0	9.0-90.0
Sex	Male	7142	55.0%
	Female	5853	45.0%
Marriage	Unmarried	6657	51.2%
	Married	3522	27.1%
	Widowed	647	5.0%
	Divorce	2168	16.7%
Ethnicity	Han	12659	97.4%
	Hui	205	1.6%
	Mongols	59	0.5%
	Man	35	0.3%
	Other	37	0.3%
Occupations	Farmers	354	2.7%
	Government employees	194	1.5%
	Professional and technical personnel	2,485	19.1%
	Service personnel	444	3.4%
	Students	629	4.8%
	The retired	4,477	34.5%
	The unemployed	3,963	30.5%
	Others	446	3.4%
Diseases types	Undifferentiated-SCZ	7467	57.5%
	Paranoid SCZ	4537	34.9%
	Residual SCZ	831	6.4%
	SCZ	48	0.4%
	Post-SCZ Depression	43	0.3%
	Nervous SCZ	29	0.2%
	Youth SCZ	25	0.2%
	Simple SCZ	15	0.1%
Therapeutic method	Electroconvulsive Therapy	1,324	10.2%
	Recreation Therapy	2,193	16.9%
	Group Psychotherapy	1,598	12.3%
	Antipsychotic Medication	2,041	15.7%
	Moritatherapy	3,368	25.9%
	Behavior Modification Therapy	2,468	19.0%

*Age was described by median average age and range of ages.
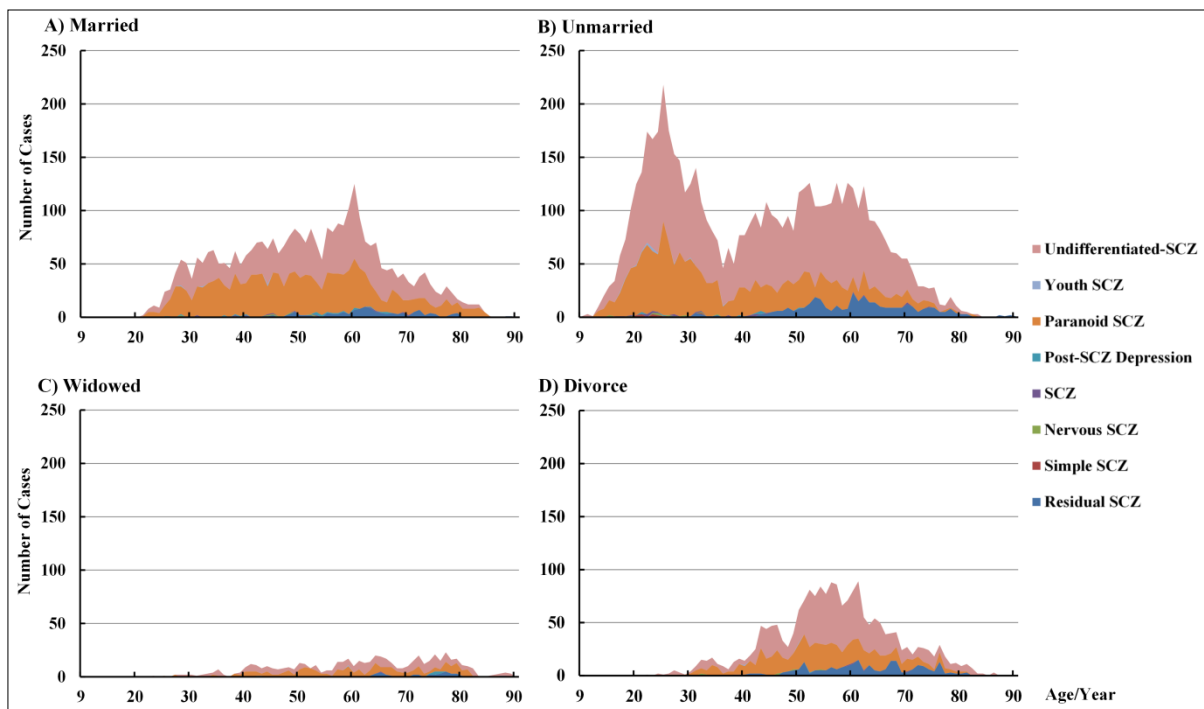
The Distribution of Different SCZ Types and Therapeutic Methods with Age

As shown in **Figure 1** and **Figure 2**, both males and females witnessed a bimodal distribution for the overall SCZ types that there were two peaks of age groups, 20-30 years and 50-60 years, with relatively larger number of cases. We analyzed it further by stratified marriage status and found that the bimodal distribution for the overall SCZ types was mainly driven by the unmarried status. Among all the SCZ types, undifferentiated SCZ, paranoid SCZ and residual SCZ accounted for the most causes, but we found undifferentiated SCZ and paranoid SCZ were the main components of SCZ in all age groups in both sexes and all the marriage status. Residual SCZ were mainly distributed in the high age groups from 50 to 80 years.
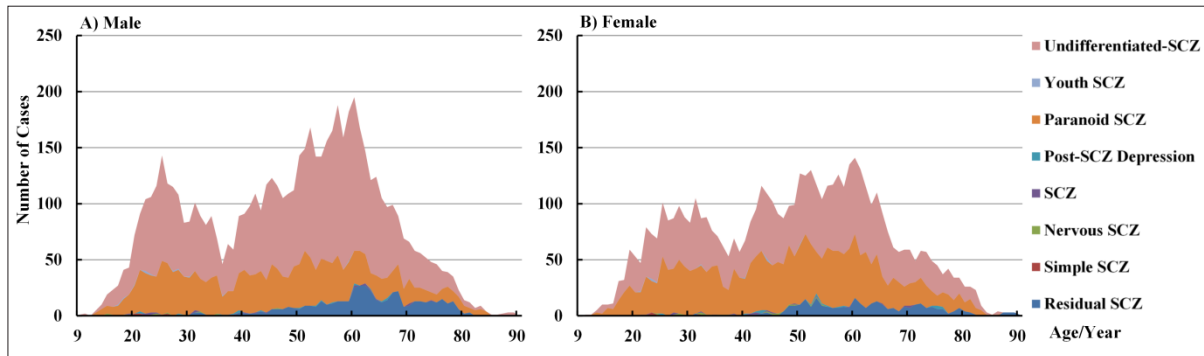
Fig 1. *The distribution of different SCZ types with age in both males and females*

Fig 2. *The distribution of different SCZ types with age in different marriage status*

As shown in **Figure 3** and **Figure 4**, six therapeutic methods used to SCZ also presented a bimodal distribution with ages. Six therapeutic methods used in all the age groups in both sexes and four marriage status, but varied by ages. Electroconvulsive therapy was mainly used in young ages from 20 to 30 years, but antipsychotic medication therapy and Morita therapy were mainly used in relatively older ages from 40 to 70 years. Other three therapy methods were evenly used among all age groups. Similar conditions were also seen in four marriage status groups.
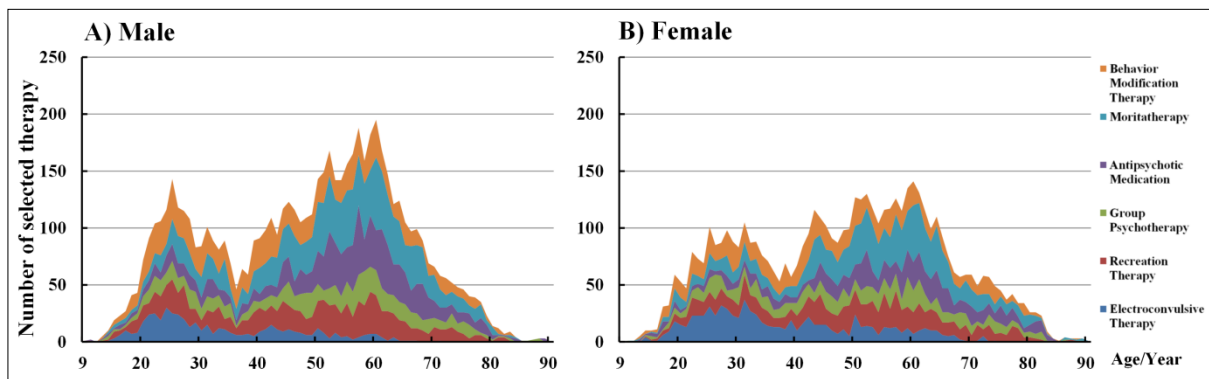
Fig 3. *The distribution of different therapeutic methods to SCZ with age in both males and females*
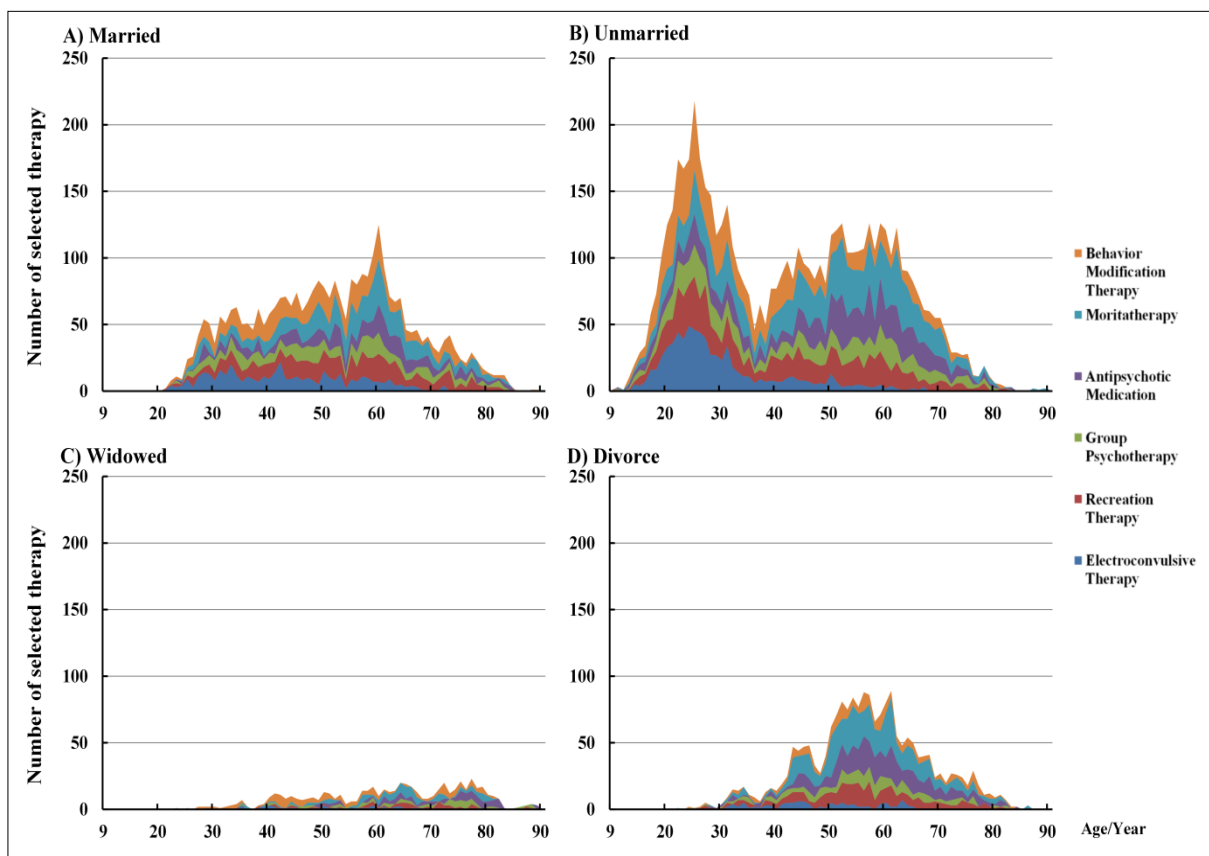

Fig 4. *The distribution of different therapeutic methods to SCZ with age in different marriage status*

The Comparison of ADL Index of Patients between Prior Treatment and After Treatment

Eight SCZ types presented the improved ADL index of patients after using the six therapeutic methods separately. Due to the limited number of cases of simple SCZ, nervous SCZ, SCZ, post-SCZ depression and youth SCZ, no obvious improvement of ADL index of patients were seen after using six therapeutic methods separately. However, paranoid SCZ and undifferentiated SCZ presented statistically significant improvement of ADL index, particularly using the electroconvulsive therapy, followed by group psychotherapy, recreation therapy, behavior modification therapy, Moritatherapy and antipsychotic medication in turn. But we did not observe statistically significant improvement of ADL index for residual SCZ after using six therapeutic methods separately (**Table 2**).

Table 2. *The improvements of ADL index based on different SCZ types and therapeutic method*

SCZ Types	Therapeutic method	Number	ADL index prior treatment	ADL index after treatment	Difference scores	t values	P values
Residual SCZ	Electroconvulsive Therapy	11	78.3±16.2	77.7±29.3	-0.6	0.055	0.956
	Recreation Therapy	152	72.2±26.1	76.0±25.2	3.8	1.124	0.262
	Group Psychotherapy	116	75.0±22.9	78.6±22.0	3.6	1.091	0.277
	Antipsychotic Medication	154	83.6±15.0	84.7±14.9	1.1	0.668	0.505
	Moritatherapy	297	84.1±14.9	84.3±16.2	0.2	0.169	0.866
	Behavior Modification Therapy	101	82.5±21.5	82.4±25.3	-0.1	0.016	0.988
Simple SCZ	Electroconvulsive Therapy	4	70.0±10.0	91.7±7.6	21.7	2.982	0.041
	Recreation Therapy	5	95.0±5.0	100.0±0.0	5.0	1.342	0.272
	Group Psychotherapy	3	75.0±35.0	100.0±0.0	25.0	1.237	0.284
	Antipsychotic Medication	0	-	-	-	-	-
	Moritatherapy	2	85.0±0.0	95.0±0.0	10.0	-	-
	Behavior Modification Therapy	1	80.0±0.0	100.0±0.0	20.0	-	-
Nervous SCZ	Electroconvulsive Therapy	16	60.9±27.6	97.7±6.1	36.8	4.328	<0.001
	Recreation Therapy	2	70.0±35.4	72.5±31.8	2.5	0.074	0.948
	Group Psychotherapy	-	-	-	-	-	-
	Antipsychotic Medication	-	-	-	-	-	-
	Moritatherapy	3	60.0±14.1	90.0±7.1	30.0	2.683	0.115
	Behavior Modification Therapy	8	65.0±0.0	65.0±0.0	0.0	-	-
SCZ	Electroconvulsive Therapy	1	90.0±0.0	100.0±0.0	10.0	-	-
	Recreation Therapy	18	86.7±9.2	97.4±6.4	10.7	3.853	0.001
	Group Psychotherapy	8	82.1±15.8	90.6±15.0	8.5	1.067	0.305
	Antipsychotic Medication	4	96.3±7.5	96.3±7.5	0.0	0.000	1.000
	Moritatherapy	6	90.8±6.6	96.7±4.1	5.8	1.832	0.097
	Behavior Modification Therapy	11	93.8±4.8	97.1±4.9	3.4	1.116	0.293
Post-SCZ Depression	Electroconvulsive Therapy	10	83.6±10.3	93.6±7.5	10.0	2.079	0.060
	Recreation Therapy	4	93.8±2.5	98.8±2.5	5.0	2.828	0.030
	Group Psychotherapy	6	92.5±2.7	97.5±4.2	5.0	2.449	0.034
	Antipsychotic Medication	5	88.0±4.5	88.0±7.6	0.0	0.000	1.000
	Moritatherapy	13	87.9±11.8	92.9±5.0	5.0	1.356	0.189
	Behavior Modification Therapy	5	91.5±5.9	97.8±6.5	6.3	2.842	0.197
Paranoid SCZ	Electroconvulsive Therapy	502	85.3±13.6	96.6±8.1	11.3	14.698	<0.001
	Recreation Therapy	788	86.6±15.4	93.8±14.8	7.2	8.664	<0.001
	Group Psychotherapy	643	86.5±15.2	93.9±12.4	7.4	8.536	<0.001
	Antipsychotic Medication	572	91.3±10.2	94.3±9.6	3.0	5.168	<0.001
	Moritatherapy	996	90.5±10.8	94.4±10.7	3.9	7.882	<0.001
	Behavior Modification Therapy	1036	88.8±14.0	94.7±12.5	5.9	6.698	<0.001
Youth SCZ	Electroconvulsive Therapy	5	63.3±23.6	100.0±0.0	36.7	3.212	0.024
	Recreation Therapy	3	97.5±3.5	93.3±7.6	-4.2	0.696	0.537
	Group Psychotherapy	3	77.5±3.5	100.0±0.0	22.5	9.000	0.012
	Antipsychotic Medication	2	95.0±7.1	100.0±0.0	5.0	1.000	0.423
	Moritatherapy	3	45.0±0.0	95.0±7.1	50.0	5.774	0.109
	Behavior Modification Therapy	9	81.6±10.3	95.6±7.5	14.0	2.379	0.055

Undifferenti-ated-SCZ	Electroconvulsive Therapy	775	80.8±15.9	94.4±9.8	13.6	18.666	<0.001
	Recreation Therapy	1221	86.1±17.5	90.7±17.9	4.6	5.970	<0.001
	Group Psychotherapy	819	82.5±19.5	88.6±19.3	6.1	5.750	<0.001
	Antipsychotic Medication	1304	88.2±14.0	90.3±14.6	2.1	3.839	<0.001
	Moritatherapy	2051	88.0±13.0	90.9±12.5	2.8	6.961	<0.001
	Behavior Modification Therapy	1297	84.6±19.7	89.1±19.9	4.5	4.014	<0.001

The Factors Affecting the Improvement of ADL Index of Patients

We used the multiple linear regression models to assess the factors of affecting the improvement of ADL index of patients based on the difference values of ADL index between prior and after treatment. We found that female could get much more ADL index' improvement compared to males ($P<0.05$). Compared to those with young ages under 20 years, patients with older ages had a worse improvement of ADL index with progressive relationship that the older they were, the worse the improvement of ADL index got ($P<0.05$). Compared to unmarried patients, those with married status had a statistically significant improvement of ADL index ($P<0.05$), but not for those with widowed and divorce. Among all the occupations, farmers might get the best improvements of ADL index with statistical significance ($P<0.05$). Among six therapeutic methods, electroconvulsive therapy could get the best improvements of ADL index with statistically significance, followed by group psychotherapy, recreation therapy, behavior modification therapy, Moritatherapy and antipsychotic medication in turn ($P<0.05$). Among all the SCZ types, compared to residual SCZ, other SCZ types tended to get better improvements of ADL index, particularly for nervous SCZ, youth SCZ, simple SCZ and undifferentiated SCZ with statistical significance ($P<0.05$). (**Table 3**)

Table 3. *The factors of improved ADL index using multiple linear regression models*

Variables		β	sd	Wald values	P	95% CI
Sex	Male (Reference)					
	Female	3.40	0.21	16.45	<0.001	2.99~3.80
Age groups	≤20 (Reference)					
	20-30	-1.46	0.62	-2.33	0.020	-2.68~-0.23
	30-40	-1.47	0.69	-2.15	0.032	-2.82~-0.13
	40-50	-2.96	0.68	-4.35	<0.001	-4.30~-1.63
	50-60	-3.90	0.70	-5.61	<0.001	-5.27~-2.54
	60-70	-4.58	0.72	-6.39	<0.001	-5.99~-3.18
	70-80	-5.69	0.79	-7.25	<0.001	-7.23~-4.16
	>80	-8.28	1.14	-7.28	<0.001	-10.51~-6.05
Marriage Status	Unmarried (Reference)					
	Married	1.80	0.25	7.10	<0.001	1.30~2.30
	Widowed	0.16	0.54	0.29	0.773	-0.91~1.22
	Divorce	0.20	0.28	0.71	0.476	-0.35~0.75
Occupations	Farmers (Reference)					
	Government employees	-3.73	1.01	-3.68	<0.001	-5.72~-1.74
	Professional and technical personnel	-4.61	0.66	-6.95	<0.001	-5.91~-3.31
	Service personnel	-3.42	0.81	-4.21	<0.001	-5.01~-1.83
	Students	-2.91	0.85	-3.42	0.001	-4.58~-1.24
	The retired	-5.52	0.65	-8.48	<0.001	-6.80~-4.25
	The unemployed	-3.64	0.65	-5.62	<0.001	-4.91~-2.37
	Others	-3.53	0.78	-4.50	<0.001	-5.06~-1.99

Therapeutic method	Electroconvulsive Therapy (Reference)					
	Recreation Therapy	-4.98	0.38	-13.01	<0.001	-5.73~-4.23
	Group Psychotherapy	-4.11	0.42	-9.91	<0.001	-4.93~-3.30
	Antipsychotic Medication	-7.74	0.38	-20.24	<0.001	-8.49~-6.99
	Moritatherapy	-7.17	0.36	-20.02	<0.001	-7.88~-6.47
	Behavior Modification Therapy	-5.96	0.43	-13.82	<0.001	-6.80~-5.11
Diseases types	Residual SCZ (Reference)					
	Simple SCZ	8.59	2.92	2.94	0.003	2.87~14.31
	Nervous SCZ	18.45	2.43	7.59	<0.001	13.69~23.22
	SCZ	2.53	1.62	1.56	0.118	-0.65~5.72
	Post-SCZ Depression	-0.40	1.69	-0.24	0.814	-3.71~2.91
	Paranoid SCZ	0.70	0.43	1.65	0.098	-0.13~1.54
	Youth SCZ	12.74	3.06	4.17	<0.001	6.75~18.73
	Undifferentiated SCZ	0.87	0.40	2.16	0.031	0.08~1.66

Note: All the results were conducted in each variable after adjusting other variables in the table.

DISCUSSION

To our knowledge, this is the first study to evaluate the ADL index improvement in the SCZ patients based on the hospital settings and large clinical sample size data in China. We assessed the distribution of proportions in different SCZ types and therapeutic methods with age from 2005 to 2015, and found that undifferentiated SCZ, paranoid SCZ and residual SCZ accounted for the most causes in clinical practice with a bimodal distribution for the overall SCZ types driven mainly by the unmarred status. Secondly, we compared the ADL index improvement using different therapeutic methods for six SCZ subtypes and found that both paranoid SCZ and undifferentiated SCZ obtained an obvious therapeutic effect, particularly using the electroconvulsive therapy. Different factors existed in ADL index improvement in SCZ patients. This study reveals the current epidemiological status of SCZ subtypes and its therapeutic methods even though in just one hospital, and provides an evidence of therapeutic methods and factors for ADL index improvement in SCZ patients.

Limited studies reported the "epidemiological landscape" for the proportions of SCZ and its secular trends changes. However, it was not until relatively recently that this uniform view of risk was efficiently dismantled in a series of meta-analyses by McGrath and colleagues, and they reported that the median incidence of 15.2 per 100,000 persons, and the central estimates of an incidence per 100.000 population per year of approximately 15 in males and 10 in females, a point prevalence of 4.6 per 1000, and a lifetime morbid risk of approximately 0.7%.[7] Another meta-analysis based on the systematic literature review from 1990 to 2013 years reported that approximately one in 200 individuals will be diagnosed with SCZ at some point during their lifetime.[8] In this study, we found that undifferentiated SCZ and paranoid SCZ were the main components of SCZ in all age groups. The bimodal distribution of SCZ subjects with ages implied these two high-risk age groups for those unmarried population aged 20-30 years and 50-60 years, which provided a priority for the identification and prevention in the future.

SCZ is characterized by positive, negative, and cognitive symptoms, and can lead to significant functional impairment. Medication treatment became available with the development of chlorpromazine in the 1950s, and antipsychotic medication development continues to this day. Unfortunately, not all patients respond to antipsychotic medications.[9] We found that electroconvulsive therapy could be the best therapy method to improve the ADL index based the hospital medical records. A consistent finding was also reported that further endorse was confirmed with the effectiveness, safety and long-term benefits of the clozapine- electroconvulsive combination in treatment of resistant SCZ.[10] Our findings further confirmed that the antipsychotic medication might be the last choice to improve the ADL index and enhance the quality of life in schizophrenic patients. Group psychotherapy,

recreation therapy, behavior modification therapy, and Moritatherapy were belong to non-drug therapy methods, which should be further improved and promoted, giving priority to drugs.

Performing ADL is necessary to maintain independent living, well-being and health related quality of life.[11] Disability relating to ADL (difficulty with or requiring assistance in at least one activity) has been associated with poorer quality of life, and in older adults is predictive of mortality.[5] Thus, the factors about the disability relating to ADL and its improvements in SCZ patients need to be further researches. There are lots of established risk factors for SCZ. including maternal stress,[12] maternal infections,[13,14] nutritional deficiencies,[15] intrauterine growth retardation, and pregnancy and birth complications.[16] However, socio-economic factors,[17,18] childhood adversity,[19] and first- and second-generation immigrant background[20,21] have also been associated with SCZ. Also, several other factors such as head injury,[22] epilepsy,[18] autoimmune diseases[23] and severe infections[24] have been associated with increased risk. However, during the period of treatment, the factor affecting the ADL index improvements may be not well studied. We found that males and older men had a high probability of not getting much improvement for ADL. Thus, elderly patients with SCZ, particularly in males, need a higher quality and strength of health care and treatment.

Several limitations needed to be mentioned. Firstly, data on the all subjects were extracted from one hospital, which might result in a partial estimate. However, all the patients evenly came from different districts in Beijing (data not shown). In addition, 10-year data accumulation with large sample size could also dilute the partial estimate. Secondly, some influence factors were not collected in the data collection, e.g., family environment, early negative experiences, family medical history and biological indicators, which could further explain the reasons of different proportions of SCZ subtypes and effectiveness of treatment for ADL index. Thus, this need further research in the further.

Conclusion

In summary, based on one hospital medical records during ten years, we found that undifferentiated SCZ, paranoid SCZ and residual SCZ were the main components of SCZ subtypes, but six regular

therapeutic methods were relatively evenly used to the patients. A new finding was that a bimodal distribution with ages existed that there were two peaks of age groups, 20-30 years and 50-60 years, with relatively larger number of cases of the overall SCZ types and therapeutic methods. Patients of males, combining with old ages and unmarried status, tend not to get higher and better improvements of ADL index, particularly for those with nervous SCZ, youth SCZ, simple SCZ and undifferentiated SCZ. Among six therapeutic methods, electroconvulsive therapy could get the better improvements of ADL index, but worse for antipsychotic medication. Thus, priority population with high risk factors and optimized therapeutic methods for SCZ needed to be further studied and identified.

Declarations

Ethics Approval and Consent to Participate

Informed consent was obtained from patients before they participated in the study. All patients were invited to complete an informed consent form for the later clinical data analysis, but the patient's personal privacy data were kept confidential, and only the routine clinical data on the patient's clinical card, including gender, age, marriage status, occupations, ethnicity, diagnose disease types and therapy methods, were used. Other raw clinical data and information were not obtained for research and analysis. If the participants were minors under the age of 18, the informed consent was required to provide from both minors and their parent or legal guardian. The project was approved by the Medical Research Ethics Committee of the Beijing Hui Long Guan Hospital (HLG2017-44).

Availability of Data and Materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Authors' Contributions

BM conceptualised and designed the study, and drafted the initial manuscript. JL; ZW; YB; WL; LB; YC assisted with data analysis and revised the manuscript. FY designed the data collection instruments, supervised data collection, carried out the analyses, and reviewed the manuscript. All the authors approved the final manuscript as submitted.

List of Abbreviations

ADL, Activities of daily living; SCZ, Schizophrenia

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