The relationship between intelligence and cognitive function in schizophrenic

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Abstract. The most common of psychotic disorders is schizophrenia. While evaluating the cognitive function with a standardized test, the intelligence test is by using the IQ test. For schizophrenic patients, intelligence is usually reported to be lower than average. This research is an analytical study that commenced in January and ended in March 2014. Primary criteria are schizophrenics who are in-patients in Prof. dr. M. Ildrem Mental Hospital, aged between 15 to 55 years old, with the highest qualification of secondary high school. The secondary criteria are those patients with other psychotic disorders, head injuries and other neurological disorders, endocrine disorders. The total sample is 100 subjects. From this study, the correlation value is 0.876 shows a very strong correlation. And the p-value 0.001. The results of this study show that there is a direct correlation (p=0.001) and a correlation (r=0.876) between intelligence and cognitive function on schizophrenic. And it is also necessary to do more researches by using other rating scales and examination to measure the relationship between intelligence and cognitive function, and other factors that may affect results.

1. Introduction
Schizophrenia is a chronic, recurrent disease, and causes a decrease in the function, especially if it does not get adequate management. In other words, schizophrenia disorder leads to disability that is irreversible and imposes a burden both on the individual and for his family.[1]

Schizophrenia is the most important and most prevalent disorder in a group of psychotic disorders. Schizophrenia is characterized by distortions of the mind and perceptions that are fundamental and distinctive, and by the dull effect. Clear consciousness and intellectual ability are usually stable, although cognitive deficits may develop later.[2]

Intelligence quotient (IQ) as a measure of intellectual ability has been extensively studied in schizophrenia. The low IQ associated with increased risk for schizophrenia. Although IQ may be a protective factor, individuals of high intellectual ability can still develop schizophrenia. Weickert et al. observed that a subgroup of chronic schizophrenia patients had average current and estimated premorbid IQ but manifested some cognitive deficits, primarily in executive and attentional function; however, preliminary results by Vinogradov et al. (2000) suggested preserved aspects of executive-attentional and motor function in high-IQ schizophrenia patients.[3]

The results of a study by Leeson et al. show a deficit in overall or only more specific disorders. Leeson et al. concluded that the comparison of patients and controls precisely matched for IQ revealed that processing speed was attenuated in recent-onset schizophrenia, contributed significantly to working and episodic memory deficits, and was a prognostic factor for poor outcome in one year.[4]
When a group of patients with schizophrenia compared with a group of psychiatric patients without schizophrenia or with the general population, schizophrenia patients tend to have lower intelligence scores. Statistically, evidence suggests that often low intelligence will arise at the beginning, and will continue to deteriorate in line with the development of this disorder.[5]

Cognitive and intellectual underperformance have consistently been shown to constitute a risk factor for the development of schizophrenia. A recent meta-analysis by Khandaker et al. 7 of 12 population-based cohorts and nested case-control studies include more than 4000 cases. 700,000 control subjects indicated that low IQ increases the risk of developing schizophrenia in a dose-response fashion (with an effect size of 0.43): every point decrease in IQ increases the risk by 3.7%. Another meta-analysis, partially overlapping with the one by Khandaker et al. 7 but including studies assessing subjects aged 16 years and younger, also found low IQ to increase the risk for schizophrenia, with an effect size of about 0.5. Interestingly, this risk was already evident by age 13 years, much years before psychosis onset. Although poor cognitive performance is a robust risk factor for schizophrenia, it is unclear whether this constitutes cognitive impairment that is present at birth or whether a relative developmental decline in cognitive functioning occurs at some point before the onset of psychosis or both. Although several studies have reported improvement in specific subtests, global cognitive change in large comparative studies in the first episode and chronic schizophrenia rarely reach an effect size of more than 0.3.[6]

Based on the above study the authors feel interested to see the relationship between intelligence to cognitive function in schizophrenia patients.

The study aims to determine the relationship of the level of intelligence and the level of cognitive function in schizophrenia patients using Wilson Rapid Approximate Intelligence Test (RAIT) to assess the level of intelligence and MMSE (Mini-Mental State Examination) for cognitive function. With a secondary aim to know the description of demographic characteristics of schizophrenia patients, to know the level of intelligence and cognitive function in schizophrenia patients.

2. Method
This research is an analytic study with the cross-sectional approach, using instruments Wilson Rapid Approximate Intelligence Test (RAIT) and the Mini-Mental State Examination (MMSE).

This research is an analytical study that commenced in January and ended in March 2014. Primary criteria are schizophrenics who are in-patients in Prof. dr. M. Ildrem Mental Hospital Medan, aged between 15 to 55 years old, with the highest qualification of secondary high school. The secondary criteria included in the study are those patients with other psychotic disorders, head injuries and other neurological disorders, endocrine disorders. The total sample is 100 subjects. Sampling was consecutive sampling. They will be given an explanation to get approval either from them and their family who accompany him. If they agree to participate in the study, then we proceed with RAIT and MMSE examination. The results will be collected and interpreted and further processed.

Researchers will seek approval from the research ethics committee of the Faculty of Medicine, Universitas Sumatera Utara.

3. Result and Discussion
From the table 1 found that the correspondent is more of the female that is as much as 58%, and most have high school education with a value of 59%. Most correspondents are aged 26-35 years by 40%. As many as 70% of correspondents have normal IQ, and only 52% of correspondents are likely to experience impaired cognitive function.

| Table 1. Distribution respondents based on age, gender and education level. |
|-----------------------------|-----------------|---|---|
| Gender | Frequency | Percent |
|-------|----------|--------|
| Women | 58 | 58 |
| Men | 42 | 42 |
And from the table 2 which presents the results of Gamma correlation test, obtained a correlation value of 0.876 indicating that there is the correlation, and the value of $p$ obtained is 0.001, denoting $p<0.005$ indicating that there is a significant correlation between the two variables tested.

**Table 2.** The relationship between intelligence and cognitive function on schizophrenic.

| MMSE     | 0-16 (Definite) | 17-23 (Probable) | 24-30 (Normal) | Total | R   | P   |
|----------|-----------------|------------------|----------------|-------|-----|-----|
| Low      | 13              | 2                | 15             | 30    | 0.876 | 0.001 |
| Normal   | 1               | 37               | 32             | 70    | 0.876 | 0.001 |
| High     | 0               | 0                | 0              | 0     | 0    | 0   |
| Total    | 14              | 52               | 34             | 100   |      |     |

This research is an analytic study with the *cross-sectional* approach is to describe and analyze a situation at a particular time, in this case, the analysis is the relationship of intelligence on cognitive function in schizophrenic patients using instruments RAIT and the MMSE.

From the results of Gamma correlation test, an obtained correlation value of 0.876 indicating that there is the correlation. And the value of $p$ obtained is 0.001, denoting $p<0.005$ indicating that there is a significant correlation between the two variables tested.

Thus, the results of this study were similar to those reported by Kremen and colleagues also found out that patients with low IQ had a low cognitive function, and, even schizophrenia patients with normal IQ. They showed neuropsychological disorders, in addition, the fact that patients with chronic schizophrenia achieving a normal IQ score strongly associated with low motivation or negative symptoms that is a major factor causing other neurocognitive deficits. It provides support for the argument that a neurocognitive is a core deficit of schizophrenia.[3] Leeson and his colleagues in his research also get the same results that intelligence significantly correlated with cognitive function, especially memory and executive function.[4] Beilen et al., in a study also get the same result, namely a clear link between the level of intelligence and memory function, attention and executive function of the cognitive function. According to him, intelligence and cognitive function may be difficult to distinguish. Intelligence is a concept based on test performance. In carrying out this test, one of the most important things is to be able to concentrate and self-directed, when an individual is experiencing a cognitive impairment, course this will be a little difficult to do.[7]

In Maudsley’s study, one-third of onset in children and adolescents had an IQ below 70 (moderate learning disability). Decrease small of the intelligence after the onset psychosis may be caused by the effect of psychotic symptoms.[20]

In schizophrenia patients, cognitive impairment is a better predictor of functional level than the severity of psychotic symptoms. Schizophrenia patients usually exhibit mild cognitive dysfunction in
the domain of attention, executive function, working memory, and episodic memory. Although a large percentage of patients have normal intelligence, it is likely that everyone with schizophrenia has cognitive impairment. Cognitive impairment in schizophrenic patients has been the target of pharmacological and psychosocial treatment trials. It is likely that treatments will become widely available within a few years, and this tends to lead to improved quality of life and the level of functioning of schizophrenic patients.[5]

The cognitive function is a fundamental recovery and quality of life in intervention. Also, Xiang and colleagues in his study found that patients with high levels of education assessed by intelligence tests correlated with good cognitive function.[20]

This study has a relatively large number of samples, using standardized assessment tools. But, the study also has a limitation, firstly, the severity of the disease have not measured with a scale of previous assessments; Secondly, the use of antipsychotic drugs and anticholinergic drugs are not measured.

4. Conclusions

The conclusion of the results of this study is the presence of a significant correlation ($p =0.001$) and very strong ($r = 0.876$) between intelligence and cognitive function level in schizophrenic patients. Thus it was found that patients with low IQ had a low cognitive function as well. From this research, it was found that the correspondent, more a female gender (58%), and no more than high school educated (59%). Most correspondents are between 26-35 years old (40%). As many as 70% of correspondents have normal IQ, and only 52% of correspondents are likely to experience impaired cognitive function.

Further research needs to be done by using other measuring instruments as well as researching the relationship of intelligence and cognitive function to other influencing factors such as education level.

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