We are of the opinion that the results of recent studies could facilitate the understanding of the opening of new possible knowledge about the etiology and pathology of schizophrenia and possibly more effective specific therapeutic action in the future, and consequently the reduction of negative symptoms and the preservation of cognitive functions and work functionality. We conclude that further research on the effects of antipsychotics at the molecular level is needed in order to understand their role in signaling pathways and effects on the energy metabolism of neurons.

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# HOW ACCURATELY DO WE CALCULATE PANSS?

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Dear Editor,

The Positive and Negative Symptoms Scale (PANSS) is a worldwide used scale to evaluate the treatment response of "Schizophrenia Spectrum and Other Psychotic Disorders." The PANSS comprises 30 items, of which seven are positive (P), seven are negative (N), and 16 are general psychopathology (G) subscales. Each item is scored between 1 and 7, and the PANSS's lowest score is 30 (Kay et al. 1987).

Even though different criteria have been defined for the treatment of response and remission in schizophrenia (Leucht et al. 2009), no consensus exists on this issue. However, scoring PANSS items between 1 and 7 and the lowest PANSS score being 30, even if no symptoms are present, may cause a significant mathematical error when determining the remission as previously earlier (Leucht et al. 2007, Leucht et al. 2010, Obermeier et al. 2011).

In this letter, we would like to emphasize the mathematical error through the example of a patient with paranoid schizophrenia who followed up with PANSS.

A 20-year-old female patient with systematic, well-organized persecution delusions and auditory hallucinations was admitted to the ward. Her functionality was poor but she had no negative symptoms. Risperidone long-acting injection 37.5 mg/2 weeks and risperidone 2 mg/day were started. The PANSS score at admission to the ward was 79 (P:32, N:7, G:40). The PANSS scores were recorded weekly. In the third week her symptoms and functionality improved. In the sixth-week, the discharge score was 42 (P:13, N:7, G:22).

The percentage change between the patient's first and last PANSS scores was 47%. She did not meet the 50% reduction criterion in the PANSS scores for remission in schizophrenia (Leucht et al. 2009). Almost complete improvement was not accurately reflected in the percentage of change in the total PANSS score. Even though she had no negative symptoms, the score of the negative subscale of PANSS was 7, and no mathematical possibility of change. At that point, a fundamental mathematical error is made because the score of "1" is given instead of '0' when the calculating the percentage change. As reported in previous articles, giving a score of "0" instead of "1" in the statement "no features related to the definition" specified in the scale item and restructuring the other ratings accordingly (0–6) will be more suitable (Leucht et al. 2007, Leucht et al. 2010, Obermeier et al. 2011). When re-scoring the patient's first PANSS according to 0–6 ratings, the PANSS score would be P:25, N:0, G:24, a total of 49, and the last PANSS score before discharge would be P:6, N:0, G:6, a total of 12. A 76% reduction would occur in the patient's total score, confirming the patient's clinical improvement.

Scoring PANSS items as 1–7 may overshadow the actual percentage change in treatment, leading to misinterpretation (Leucht et al. 2007, Leucht et al. 2010, Obermeier et al. 2011). Therefore, some researchers suggest that response rates with low cut-off values, such as 20%, are used in studies to avoid low response rates, especially with second-generation antipsychotics (Leucht et al. 2010). Moreover, some authors emphasize that the results of all studies used to determine the response rate with the 1–7 scoring system are erroneous and represent fewer improvement rates. Thereupon, they state that the 0–6 scoring system will be the correct method to determine the response status with the percentage change in future studies (Leucht et al. 2007, Leucht et al. 2010, Obermeier et al. 2011).

When the literature was reviewed, we found some similar recommendations (Leucht et al. 2007, Leucht et al. 2010, Obermeier et al. 2011). In the one of them, the studies published in the ten most cited journals in psychiatry using the keywords "PANSS" and "response" were reviewed. The percentage change expression was not correctly calculated in PANSS. Moreover, it was a mathematical error in converting scale scores into percentage changes in evaluating treatment response (Obermeier et al. 2011). For the past 11 years, we have noticed no review article or comment on this topic in the literature. Even though sample studies exist in which the 0–6 scoring system is recalculated by subtracting 30 points, as suggested in some studies where the treatment response is evaluated over the percentile change with PANSS. Many clinical studies, systematic reviews, and meta-analysis studies are present in which the treatment response status is determined through the calculation made with the 1–7 scoring system. This situation leads to ambivalence in the psychiatry literature and, more importantly, to cumulative erroneous information. Hence, this situation should be brought to the agenda again, especially if determining the response level over the percentage change by using PANSS was aimed in the research area, the 0–6 scoring system would be mathematically correct and appropriate.

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