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Voxel-Based Morphometry for Separation of Schizophrenia From Other Types of Psychosis in First-Episode Psychosis: Diagnostic Test Review

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Subtle but widespread deficit in the cortical and subcortical grey matter is a consistent neuroimaging observation in schizophrenia. Several studies have used voxel based morphometry (VBM) to investigate the nature of this structural deficit. We conducted a diagnostic test review to explore the diagnostic potential of VBM in differentiating schizophrenia from other types of first-episode psychoses.

Key words: morphometry/neuroanatomy/structural MRI/diagnostic accuracy

Background

Schizophrenia is a psychiatric disorder which involves distortions in thought and perception, blunted affect, and behavioral disturbances. The longer psychosis goes unnoticed and untreated, the more severe the repercussions for relapse and recovery. There is some evidence that early intervention services can help, and diagnostic techniques that could contribute to early intervention may offer clinical utility in these situations. The index test being evaluated in this review is the structural magnetic resonance imaging (MRI) analysis technique known as voxel-based morphometry (VBM) that estimates the distribution of gray matter tissue volume across several brain regions. This review is an exploratory examination of the diagnostic potential of VBM for use as an additional tool in the clinical examination of patients with first-episode psychosis to establish whether an individual has a diagnosis of schizophrenia as opposed to other types of psychosis.

Objectives

To determine whether VBM applied to the MRI brain images can be used to differentiate schizophrenia from other types of psychosis in participants who experience first-episode psychosis.

Search Methods

In December 2013, we updated a previous search (May 2012) of MEDLINE, EMBASE, and PsycInfo using OvidSP.

Selection Criteria

We included retrospective and prospective studies that consecutively or randomly selected adolescent and adult participants (<45 years) with a first episode of psychosis; and that evaluated the diagnostic accuracy of VBM for differentiating schizophrenia from other psychoses compared with a clinical diagnosis made by a qualified mental health professional, with or without the use of standard operational criteria or symptom checklists. We excluded studies in children, and in adult participants with organic brain disorders or who were at high risk for schizophrenia, such as people with a genetic predisposition.

Data Collection and Analysis

Two review authors screened all references for inclusion. We assessed the quality of studies using the QUADAS-2 instrument. Due to a lack of data, we were not able to extract 2×2 data tables for each study nor undertake any meta-analysis.
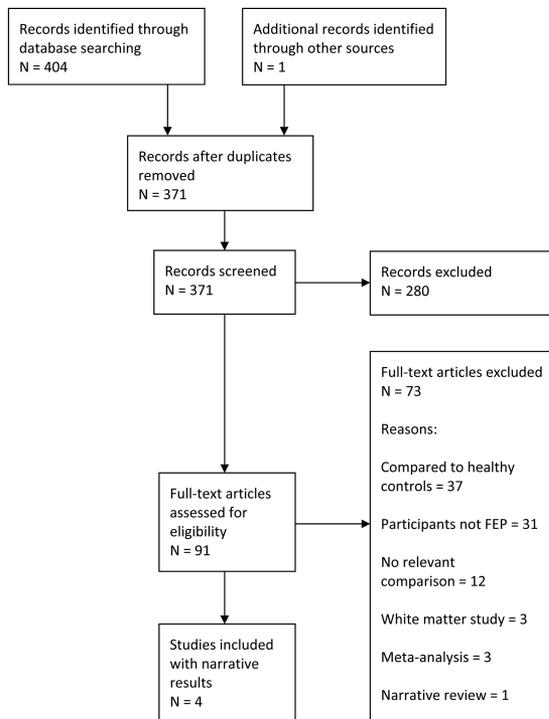
Fig. 1. PRISMA diagram.

Main Results

We included 4 studies with a total of 275 participants with first-episode psychosis. Diagnostic accuracy of VBM was not evaluated in any of the studies, instead VBM was used to quantify the magnitude of differences in gray matter volume. Therefore, none of the included studies reported data that could be used in the analysis, and we summarized the findings narratively for each study (see figure 1).

Authors' Conclusions

There is no evidence to currently support diagnosing schizophrenia (as opposed to other psychotic disorders)

using the pattern of brain changes seen in VBM studies in patients with first-episode psychosis. VBM has the potential to discriminate between diagnostic categories but the methods to do this reliably are currently in evolution. In addition, the lack of a direct evaluation of the use of VBM to clinical practice in the studies to date limits the assessment of the diagnostic ability of VBM to differentiate schizophrenia from other types of psychotic presentations. Studies with an emphasis on statistical discrimination approaches, using all of the brain-wide information collected from VBM studies, especially in first-episode populations with prospective diagnostic validation, need to be conducted to realize the diagnostic potential of VBM (for full details, please see Palaniyappan et al[1]).

Reference

1. Palaniyappan L, Maayan N, Bergman H, Davenport C, Adams CE, Soares-Weiser K. Voxel-based morphometry for separation of schizophrenia from other types of psychosis in first episode psychosis. *Cochrane Database Syst Rev.* 2015;8:CD011021. doi:10.1002/14651858.CD011021.pub2.