

Evaluating co-morbidities in an Attention Deficit Hyperactivity Disorder (ADHD) sample;

Can Quantitative Electroencephalogram (QEEG) measures discriminate?

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Objectives

- To evaluate the extent of comorbidities in a paediatric ADHD sample.
- To investigate if QEEG measures can discriminate between samples with different comorbidities.



Background

QEEGs have been used to evaluate brain activity profiles in children with varying clinical disorders. They have often reported that the majority of children with ADHD show excess slow wave activity (Cantor and Chabot, 2009), with other sub-samples characterised by excess beta or excess alpha activity (Clarke et al., 1998).

This area of research has been hampered by the common presence of comorbidities in patients with ADHD (Larson et al., 2007). Cantor and Chabot (2009) suggest it may not be possible to discriminate between sub samples with more than one childhood disorder using QEEGs.

The recent decision by the NIMH to place less emphasis on the DSM-V when allocating research funds suggests a move to more symptom-type classification approaches. As symptoms can co-exist in many diagnostic disorders it is essential we learn more about potential markers that might differentiate these symptoms. QEEG profiles may provide some information in this regard.

Method

Data was collected from 195 children patients aged between 5 and 18 who underwent assessment for neurodevelopmental disorders. The assessment included cognitive tests, QEEGs, school/parent feedback, continuous performance tests and clinical consultation.

The subjective reporting of symptoms was via a clinic-developed check-list.

EEG data was recorded using 19 channels placed according to the International 10-20 system on a Neuropulse Systems 24 amplifier. All electrode impedances were reduced to below 5KOhms. Each patient sat at rest for 1 minute periods alternating between eyes closed and eyes open. The data was digitized and edited using Independent Components Analysis to reduce artefact and subjected to quantitative spectral analysis using Neuroguide (Thatcher et al., 2003).

Results

In 52% of cases, ADHD inattentive subtype was diagnosed compared to 42% ADHD combined subtype. In 86% of cases, the child had at least one comorbidity. The most common comorbidity was Oppositional Defiant Disorder (ODD), which was diagnosed in 9% of the ADHD inattentive subtype group compared to 43% of the ADHD combined subtype group.

Of those who suffered from impulsivity, 34% showed excess frontal slow wave activity (delta and/or theta), which was also the case for those who reported inattentive symptoms (76%). Of those with ADHD and ODD, those with excess slow wave activity increased (85%), but a greater proportion also exhibited excess beta activity (63%).

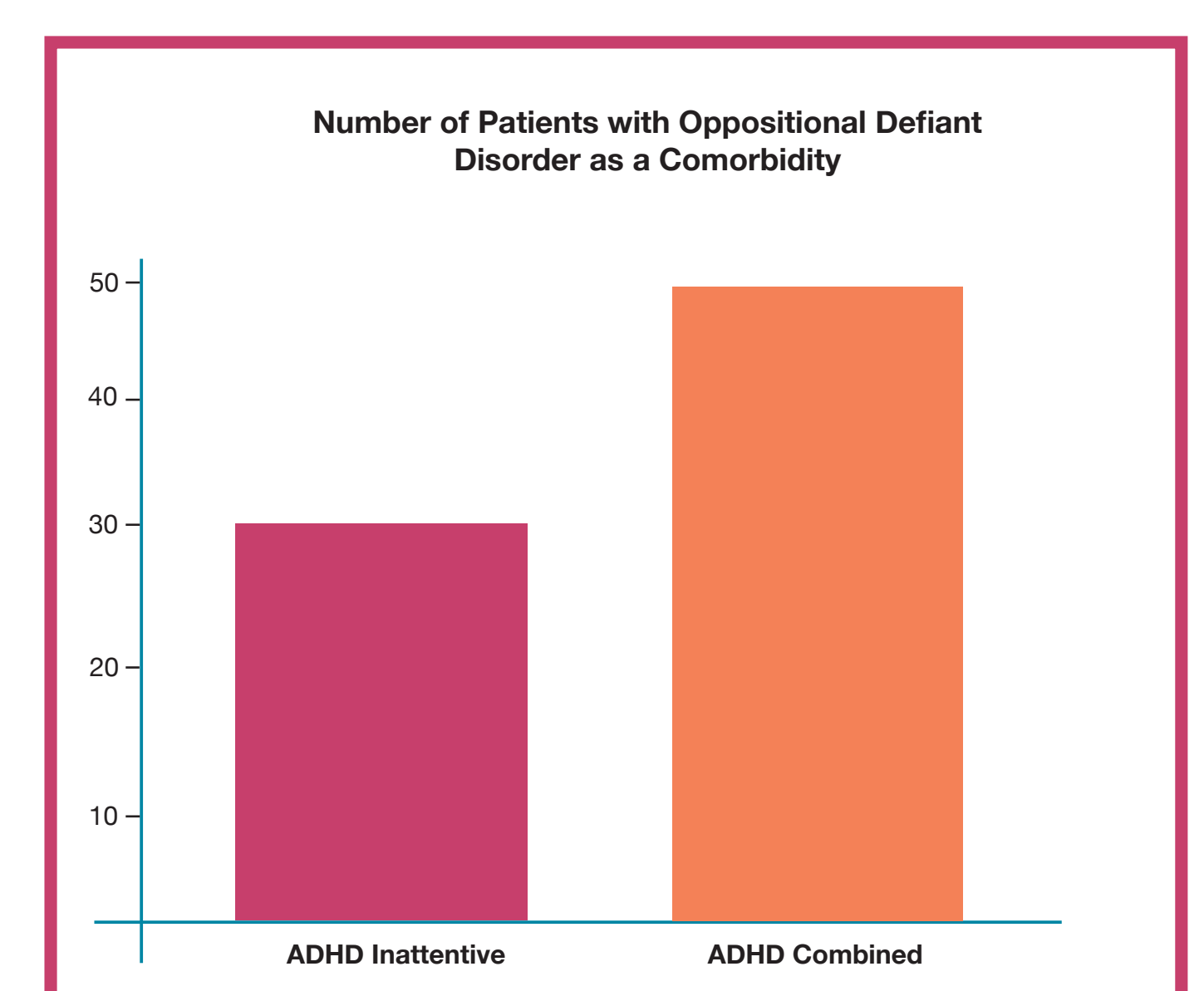


Figure 1

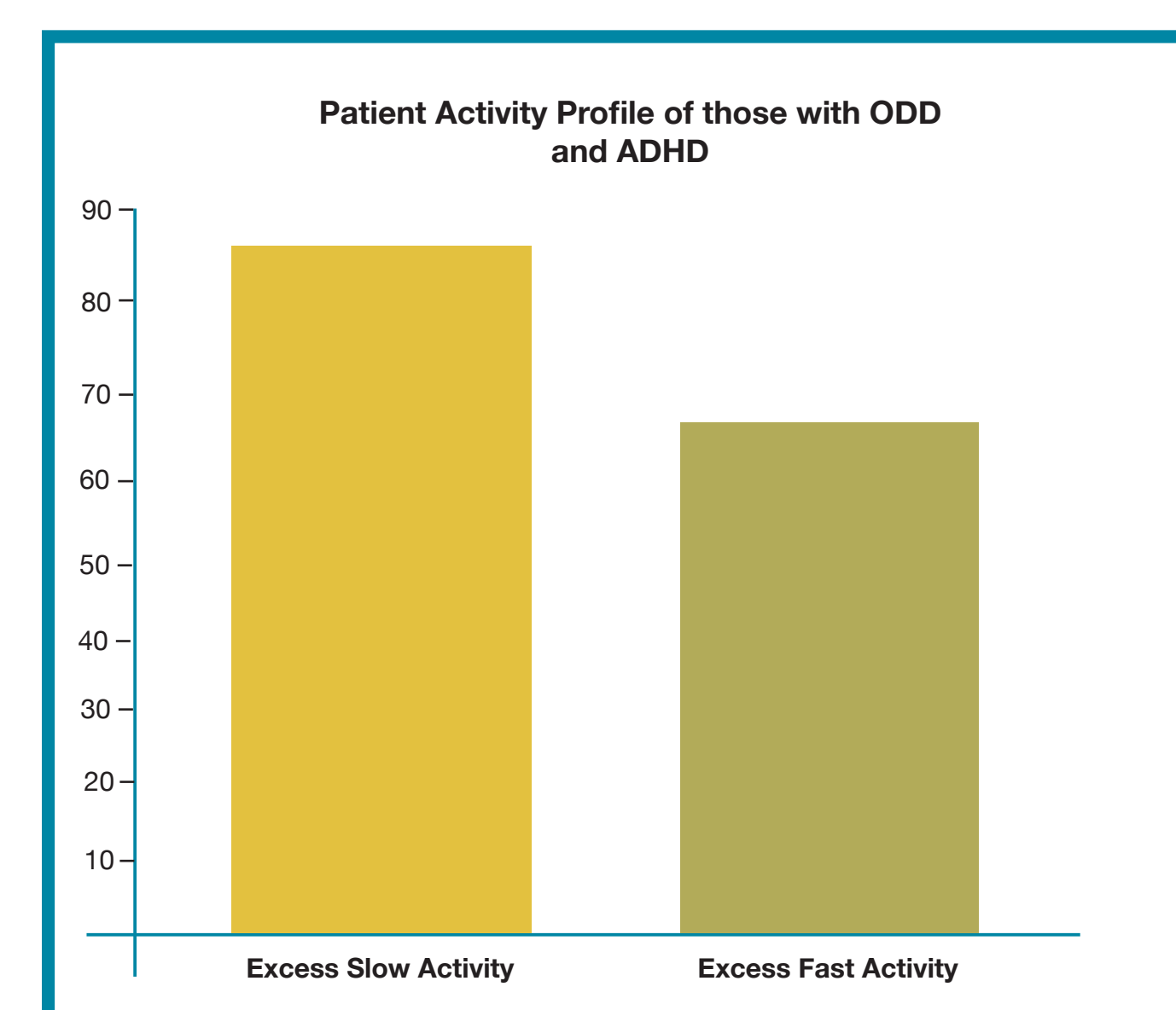


Figure 2

Conclusions

This study found that comorbidity within an ADHD patient sample is common. One particular comorbidity was investigated, that of ODD. The brain activity profile of this sample suggested that it differs from those without the comorbidity. Specifically, it would appear that an additional element whereby excess fast activity is increased is more likely to be present with patients diagnosed with both ADHD and ODD. This additional activity profile is alongside the usual excess slow wave activity. So, although further investigation is obviously needed it might be that QEEG measures, brain activity, may provide a method to differentiate those with certain combinations of disorders such as ADHD and ODD.



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