[CENTRAL SENSITISATION IN HAND OSTEOARTHRITIS: THE ANTERIOR CINGULATE CORTEX IS INVOLVED IN PAIN PROCESSING](https://cris.sgul.ac.uk/viewobject.html?cid=1&id=207979" \o "View details)

Abstract

Background

We have previously shown that people suffering with chronic pain in hand OA have activation of central brain pain processing centres localised to the anterior cingulate cortex, insular cortex and thalamus by functional neuroimaging (1) and algometry (2). Objectives We hypothesised that hand OA subjects will have structural differences in 3 pain-processing regions of the brain - the anterior cingulate cortex (ACC), insular cortex and thalamus - based on activation of brain centres we have found previously (1). Our brain neuroimaging work was part of a randomised, placebo-controlled trial to assess the effect on clinical pain outcomes by intervention with centrally-acting analgesic agents: pregabalin or duloxetine.

Methods

The primary outcome measures for our clinical trial were hand pain Numerical Rating Scale (NRS) and AUSCAN pain after 12 weeks' treatment. In secondary outcome analyses, participants with hand OA (n=28) underwent T1-weighted MRI of the brain before and after 12 weeks of treatment with pregabalin, duloxetine or placebo therapy. Grey matter brain structure was compared using FreeSurfer regional volumetric analysis and voxel-based morphometry (VBM) to age-matched controls (n=11), and evaluated for volume changes in the ACC, insular cortex and thalamus. Results In our clinical trial, we observed clinically significant improvement in pregabalin, duloxetine and placebo treatment groups after 12 weeks (ANOVA p=0.0078). Most notably, pairwise comparisons for pregabalin vs placebo showed significant improvement for NRS pain and AUSCAN pain outcomes in the ITT analysis (p<0.05), but not for duloxetine vs placebo after 12 weeks' (p>0.05). Both voxel-wise and regional volumetric analyses demonstrated areas of reduced grey matter volume in the ACC of hand OA subjects, relative to control subjects, at baseline (p<0.05). The structural differences in the ACC persisted following 12 weeks of treatment with pregabalin, duloxetine or placebo therapy (p<0.05). We did not observe structural differences in the insular cortex or thalamus in any of the three groups.

Conclusions

We found that the ACC volume was reduced in participants with hand OA. The ACC is a key pain-processing region of the brain. Changes in ACC grey matter volume have previously been described in other painful conditions, but not hand OA. ACC grey matter volume reduction is thought to represent neural plasticity in chronic pain states. Our data supports the role of central sensitisation in hand OA and provides a rationale for the further investigation of centrally-acting analgesics in its management. Our trial demonstrated improvement in clinical endpoints for pain for pregabalin vs placebo and duloxetine vs placebo, respectively (p<0.05). However, structural differences in the ACC were still evident following 12 weeks of treatment with pregabalin or duloxetine. This may relate to the relatively short duration of treatment in our study. Alternatively, the baseline differences in the ACC may represent irreversible changes. Longitudinal studies with greater follow-up periods are necessary to further investigate this.

References

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2. Wajed J, et al. International Journal of Rheumatology 2012; 2012:703138. References

Acknowledgements

We acknowledge support from the Rosetree's Trust and the NIHR Clinical Research Network.