

# Correlation between inferior occipital gyrus and subjective drug craving in former drug addicts: An fMRI study

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## ABSTRACT

**Introduction:** While numerous attempts of treatment have been made to overcome drug addiction, the number of people abusing drugs and relapsing is still increasing in Malaysia. One of the contributing factors to substance addiction and relapse might be the feeling of craving, which is defined as a strong urge or need to consume a substance. Drug craving can be triggered by substance exposure or cues associated with the substance, and it has become a predictor for relapse and dropout from treatment. Several studies found a significant correlation between drug craving and brain region activation in the presence of drug-related cues. However, these studies are limited to active drug addicts, with little understanding of former drug addicts (FDAs). Thus, this study aims to investigate the correlation between drug-related brain areas and subjective craving among the FDAs in Malaysia. **Materials and Methods:** Utilizing a cross-sectional study design, 24 former male drug addicts were selected from rehabilitation centres under National Anti-Drugs Agency (NADA). Out of the initial 24 participants, four were discarded for not meeting the inclusion criteria. The participants viewed drug-related cues displayed using a block-design task while undergoing functional magnetic resonance imaging (fMRI) for a duration of 16 minutes. After the fMRI procedure, subjects were required to rate their craving intensity to abuse drugs on scale of 0 to 100 using visual analogue scale (VAS). The fMRI data were pre-processed and analysed using fixed-effect analysis (FFX) and random-effect analysis (RFX) in Statistical Parametric Mapping 12 (SPM12). The significant brain region (PFWE < .05) with the highest t-value generated from the RFX was selected as the region of interest (ROI). The number of voxels (NOV) in the ROI were extracted from individual participants using WFU PickAtlas. A Spearman's rank-order correlation was conducted to assess the relationship between the NOV and VAS craving score. **Results:** The RFX results revealed significant activation in seven brain regions with the left inferior occipital gyrus (L\_IOG) showing the highest t-value. The activation in the L\_IOG may be due to its role in processing visual information that is linked to functional terms (object, task and visual). Correlation analysis indicated a non-significant, fair positive correlation between the NOV in the L\_IOG and the VAS scores ( $r = 0.372$ ,  $p = 0.106$ ). This finding suggests a trend where higher brain activity in L\_IOG is associated with higher drug craving. The insignificant correlation between brain activity and drug craving may be due to long-term drug abstinence. Additionally, FDAs might have developed desensitization, or they no longer feel cravings toward drugs. **Conclusion:** The study concludes that L\_IOG is activated by drug-related cues, however this activation is not correlated with drug craving. This finding suggests that the brains of FDAs who have undergone rehabilitation centre no longer show significant response to drug-related cues. Future research should compare brain response toward drug-related cues between FDAs with different genders.