Table 2 - *Included articles description and methodological quality assessment*

Authors/year	Sample size (total/ Obeses)	Country	Objectives	Neuroimaging instrumental	Cognitive Tests	Main results	Conclusions	Quality assessment (nhlbi)
Stingl*et al* (2012)	68/34	Germany	To investigate differences in executive functions between lean and obese subjects and whether the changes in the frontal cortex is affected by stimuli related to food or not related to food. Through visual memory task.	EEG/MEG	Visual memory task.	In the very early phase (0-100ms) RMS (root mean square) was positively correlated with reaction time and BMI and negatively with accuracy.	Reduced performance and specific changes in executive functions in subjects with higher body weight. The results describe altered function of brain areas related to inhibitory control in obese subjects.	FAIR (50%)
Tuulari*et al* (2015)	41/27	Finland	To study the brain circuits involved in cognitive appetite control.	fMRI	Food stimuli with images of foods.	Obese subjects had stronger functional connectivety between middle frontal cortex and bilateral supplemental motor area.	The premotor areas, superior frontal cortices and precuneus support cognitive control of appetite. The obese showed reduced response during appetite control. This suggests that inhibitory function seems to be preserved in obese subjects, but altered reward and homeostatic signaling.	GOOD (57%)
Hendrick *et al* (2012)	43/13	USA	Investigate the neural processes of cognitive control	fMRI	“GO” and “STOP” signal task.	There was a negative correlation	Obese individuals have lower levels of dopamine D2	GOOD (57%)

			in relation to obesity			between BMI and brain areas activated during the stop signal task. In particular, activation of the right anterior insula during the saliency process showed strong correlation with BMI.	receptor. This receiver is positively correlated to the metabolism of the prefrontal cortex. In addition, obesity is associated with altered saliency processing, consistent with cognitive impairment.	
Volkow *et al* (2009)	21/3	USA	To evaluate the influence of BMI in cognitive performance in healthy individuals	PET	Tests for memory and executive function.	Despite this, the parametric analysis between BMI and cerebral metabolism during the cognitive task was not statistically significant. As well as the correlation between metabolism and neuropsychological measures.	It is concluded that the results may have been affected by the sample size and because it is healthy individuals. Furthermorecognitive impairments related to transportation and receipt of dopamine, altered in obese individuals.	FAIR (50%)
Fernandez *et al* (2015)	39/20	Spain	To evaluate the brain	MRI - DTI	Trail making Test (motor	There was a negative	The microbial profile of the	GOOD (57%)

			microstructure and cognitive function in association with microbiological profile of intestinal tract.		speed, attention and cognitive flexibility).	correlation between fat mass and markers metabolic and inflammatory agents associated to obesity with the bacterial diversity.	human gut is related to cognitive function and brain microstructure. It was observed cognitive decline related to age in individuals of middle age. How changes in gut microbiota influence cognitive decline remains to be determined.	
Puig *et al* (2015)	44/24	Spain	Assess injuries and hypothalamic examine these effects on cognitive performance.	MRI - DTI	WAIS, Trail making Test, Wisconsin Card Sorting Test.	There was a negative correlation between BMI and the marker of hypothalamic damage (with worsening of cognitive).	The Hypothalamus is important in cognitive performance. Hypothalamus damage can be a factor that contributes to obesity. However, the authors could not say whether the hypothalamic damage are involved in the pathogenesis of obesity or is it just a marker of obesity.	GOOD (64%)
Garcia-Garcia *et al* (2012)	34/18	Spain	To investigate the possible alterations of cerebral connectivity RSN and examine whether the activity abnormal RSN may be related to	fMRI	Verbal memory and learning, speed of processing, executive functions.	There was a negative correlation between speed of information processing and activation	The putamen is related to the control of movement and speed of processing. Thus, the authors suggest that the	GOOD (57%)

			cognitive performance.			of the putamen in obese individuals.	abnormal activation on the external network (circuit of the basal ganglia) may contribute to overeating in obesity, through the imbalance between the process of homeostasis and the excess.	
Balodis*et al* (2013)	35/13	USA	Investigate the correlations of neural cognitive control is inhibitory to the dietary restraint scores.	fMRI	Stroop color-word interference task.	The obese showed increased activity during the congruent and incongruent, being provided incongruous to greater brain activity. The individuals lean presented lower difference between the conditions.	The group of obese individuals with binge eating established showed a decrease in the activity of the inferior frontal gyrus. The obese without binge eating disorder had a positive correlation with the activation of the inferior frontal gyrus and the task of the Stroop Test. The authors conclude that these differences in the neural substrates involved in inhibitory control distinguishes the various manifestations of obesity.	FAIR (50%)

Bolzenius*et al* (2015)	62/7	USA	To investigated the impact of high BMI on cognitive performance, which represent cognitive domains associated with the specific tracts of interest.	MRI - DTI	Executive function (CWIT, D-KEFS, LNS), processing speed (TMT), memory (RBANS).	After control of the age factor, there was no significant correlation between BMI and cognitive performance.	Were observed structural changes of the white substance, but was not observed cognitive decline in this sample, associated with BMI.	FAIR (50%)
Hume *et al* (2015)	81/19	South Africa	Explore the neurophysiological reaction of obese, overweight and normal weight to foods cue.	EEG-ERP	Modified Stroop task.	There was no significant difference between the groups in relation to the reaction time and accuracy of responses in the task of the Stroop Test.	Overweight and obese individuals showed rates of cortical excitation and attentional process associated with increased reactivity to visual food cues.	FAIR (50%)
Nijs*et al* (2010)	40/20	Netherlands	Evaluate the correlation between score of attentional error and style of power between lean and obese.	EEG	Food-related Stroop task.	The obese had a lower reaction time the words related to food, in relation to individuals of normal weight.	The increase of attention by stimuli related to food can be an important factor in eating behavior in obese individuals.	GOOD (57%)

NHLBI = National Heart's Quality Assessment of Observational Cohort and Cross-Sectional Studies, Lung and Blood Institute; EEG/MEG = electroencephalography/magnetoencephalography; fMRI = functional magnetic resonance imaging; PET = positron emission tomography; MRI-DTI = magnetic resonance imaging-diffusion tensor imaging; EEG-ERP = electroencephalography-event related potencial; CWIT = color-word interference test; LNS = letter-number sequencing test; D-KEFS = Delis-Kaplan executive function system; TMT = trail making test; RBANS = repeatable battery for the assessment of neuropsychological status