Attention deficit/hyperactivity is widely characterized by inadequate inhibitory control, problems related to task execution, motivation or impaired attention control. Electroencephalographic alpha wave power suppression above the somatosensory cortex is thought to reveal a movement or attention type pattern when contrasted to a baseline. The proposed research attempts to reveal whether there are ADHD-related differences in the activity and nature of alpha EEG wave oscillations during observation-execution tasks. To do so, alpha power suppression through time, frequency and spatial analysis was performed. It is reasonable to assume that different processes may be present in the alpha band, but new research advises about the strong relevance of the somatosensory system during observation-execution processes and indeed, a disruption of this mechanism can lead to some developmental disorders. The results show significant differences in suppressing Mu rhythm for the control group and ADHD group, and also for the combined and inattentive subtypes. Differences were detected for 8–10 and 10–12 Hz frequency ranges in the case of the ADHD group and the combined subtype, and 8–10, 8–12 and 10–12 Hz in the case of the inattentive and hyperactive subtypes. Hence, from these findings it could be interpreted that the ADHD groups have a different conceptualization of external stimuli, and this was perceived in different EEG activity within the somatosensory area. In conclusion, this research could help to understand the mechanism underlying conceptual representation and behavioral performance associated with this disorder.