Optic disc drusen (ODD) are found in up to 2.4% of the population and are known to cause visual field defects. The purpose of the current study was to investigate how quantitatively estimated volume and anatomic location of ODD influence optic nerve function. Anatomic location, volume of ODD, and peripapillary retinal nerve fiber layer and macular ganglion cell layer thickness were assessed in 37 ODD patients using enhanced depth imaging optical coherence tomography. Volume of ODD was calculated by manual segmentation of ODD in 97 B-scans per eye. Anatomic characteristics were compared with optic nerve function using automated perimetric mean deviation (MD) and multifocal visual evoked potentials. Increased age (P = 0.015); larger ODD volume (P = 0.002); and more superficial anatomic ODD location (P = 0.007) were found in patients with ODD visible by ophthalmoscopy compared to patients with buried ODD. In a multivariate analysis, a worsening of MD was significantly associated with larger ODD volume (P <0.0001). No association was found between MD and weighted anatomic location, age, and visibility by ophthalmoscopy. Decreased ganglion cell layer thickness was significantly associated with worse MD (P = 0.025) and had a higher effect on MD when compared to retinal nerve fiber layer thickness. Large ODD volume is associated with optic nerve dysfunction. The worse visual field defects associated with visible ODD should only be ascribed to larger ODD volume and not to a more superficial anatomic ODD location.