Tinnitus can have serious impact on a person's life and is a common auditory symptom that is especially comorbid with hearing loss. This study investigated processing effort required for speech recognition in a group of hearing-impaired people with tinnitus and a control group (CG) of hearing-impaired people without tinnitus by means of pupillary response. Furthermore, the relationship between the pupillary response, self-rating measures of tinnitus severity, and fatigue was examined. Participants performed a speech-in-noise task with a competing four-talker babble at two speech intelligibility levels (50% and 95%) with either an active or inactive noise-reduction scheme while the pupillary response was recorded. Tinnitus participants showed significantly smaller time-dependent pupil dilations and significantly higher fatigue ratings. No correlation was found for the tinnitus severity and pupillary response, but a significant correlation was found between the tinnitus severity and fatigue. As participants with tinnitus generally reported higher fatigue and showed smaller task-evoked pupil dilations, it was speculated that this may suggest an increased activity of the parasympathetic nervous system, which governs the bodily response during rest. The finding that tinnitus participants showed higher fatigue has clinical implications, highlighting the importance of taking steps to decrease the risk of developing long-term fatigue. Finally, the tinnitus participants showed reduced pupillary responses when noise reduction was activated, suggesting a reduced effort from hearing aid signal processing.