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Abstract

Migraines affect a large number of people and can make everyday activities difficult to manage. Many people use ice packs or cooling wraps for relief, but these solutions do not stay cold for long and require frequent replacement. Because of this, there is a need for a more consistent and longer-lasting cooling option. The goal of this project was to design and build a wearable cooling cap using thermoelectric cooling. The design focused on cooling the front of the head while transferring heat away toward the neck. A beanie-style cap was used with two Peltier modules placed in the front, along with heat sinks and small fans to remove heat. Tubing was also added to direct warm air toward the back of the neck to prevent heat buildup. After testing, the cap was able to produce noticeable cooling at the front of the head, and the added fans and heat sinks improved performance. While temperature sensors were included, they did not always provide consistent readings. Overall, this project shows that a thermoelectric cooling cap is a possible solution for migraine relief and has strong potential for improvement. In terms of sustainability, this design reduces the need for disposable cooling products like ice packs by reusing the excess warm air generated by the system and redirecting it toward the neck, where it may help loosen stiff muscles during migraines while also improving overall energy use.