

Alterations in Intraocular Pressure and Corneal Thickness Immediately Following a 161-km Foot Race

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ABSTRACT

INTRODUCTION: Significant visual impairment is estimated to occur in 3% of participants in 161-km ultramarathons. Initial research indicates this is most often due to a transient corneal edema. The normal physiological changes of the eye in response to prolonged exercise have not been previously reported. **PURPOSE:** To determine the effect of prolonged exercise (14 to 30 hours) on intraocular pressure and corneal thickness.

METHODS: Entries of the 2013 161-km Western States Endurance Run were invited to participate in our study via pre-race email. During the 2 days prior to the race, informed consent was obtained and pre-race testing was performed. Pre- and immediate post-race, binocular and monocular visual acuity was measured using an illuminated Snellen eye chart and intraocular pressure was measured in both eyes with Tonopen XL (Reichert Technologies, Depew, NY). Pre- and immediate post-race corneal thickness was measured three times in rapid succession using an ultrasonic pachymeter (Corneo-Gage Plus, Sonogage, Cleveland, OH) after corneal anesthetization with 0.5% proparacaine hydrochloride.

RESULTS: Eight entrants completed the study among which, six reported a prior history of ultramarathon-associated visual impairment. Three had a history of bilateral refractive surgery. One participant reported a period of “tunnel vision” during the race. Beyond this, there were no reports of visual impairment during this race which had a temperature range of 5.0 to 39.0°C. Pre- and post-race visual acuity measurements were essentially unchanged. Pre- and post-race corneal thickness did not change ($p=.3$) with a mean (\pm SD) of 661 (\pm 82) μ m pre-race and 666 (\pm 84) μ m post-race. Post-race intraocular pressure decreased from pre-race values in 10 of 16 eyes, was unchanged in 2 and higher in 4, with mean (\pm SD) pressure being 12.9 (\pm 3.1) and 11.4 (\pm 3.5) pre-race and post-race, respectively ($p=0.2$).

CONCLUSIONS: Within this small sample, visual acuity, corneal thickness and intraocular pressure were not significantly altered by completion of a 161-km foot race. These findings offer some reassurance to athletes who might have concern about elevating intraocular pressure from ultramarathon running.