

水分摂取量の違いが高血圧中高年登山者の 登山時の血圧に及ぼす影響

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Effects of Different Amount of Water Intake on Blood Pressure in Elderly Hypertensive Trekkers during Mountaineering

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ABSTRACT

Hydration is recommended in order to decrease the overload on the cardiovascular system during endurance exercise. The amount of water that an individual may consume is often restricted during mountaineering. Fifteen hypertensive (resting systolic blood pressure, SBP ≥ 140 mmHg and/or diastolic blood pressure, DBP ≥ 90 mmHg) and 8 normotensive (NT) volunteers, aged 64.0 ± 4.2 yr, participated in mountain hiking (elevation 935.9 m) to determine whether or not a sufficient amount of water was normally consumed in order to prevent the effects of dehydration. The hypertensive subjects were divided into two groups at random. One group took water freely (8 hypertensive group: HT), while the other group were told to consume 4000ml of water (7 hypertensive supplied water group: HT-W) while hiking. The NT group consumed water freely. All subjects were members of an alpine club and thus had some experience in mountaineering. The SBP and DBP, body weight, and specific gravity of the urine were all measured before and after hiking. In addition, the subjects recorded their blood pressure (BP) at 10 measurement points designated along the climbing route. The heart rate (HR) was recorded every minute continuously during mountaineering. The total climb took

about 7 hours, there were no differences in the time between three groups. The amount of water which subjects drank were HT-W 4000ml, NT 1138 ± 366ml, HT 1450 ± 832ml, respectively. The average change in body weight from before hiking was -1.0 ± 0.7kg in NT, -1.1 ± 0.4kg in HT, and -0.1 ± 0.7kg in HT-W after hiking, respectively. There was a significant difference between the HT-W and the other groups ($p < 0.05$). Repeated measures ANOVA exhibited a main effect among the groups regarding the HR responses (HT > HT-W > NT). Repeated measures ANOVA exhibited a main effect among the groups and the BP responses (HT-W > HT > NT). Our findings suggested that dehydration during mountaineering in hypertensive trekkers may thus result in an inability to maintain cardiac output due to a reduced blood volume when only consuming water freely. In conclusion, it is important for hypertensive elderly trekkers to maintain their hydration levels by sufficient fluid replacement during mountaineering.

要 旨

登山前に高血圧を示した15名（SBP ≥ 140mmHgもしくはDBP ≥ 90mmHg）を無作為に8名の飲料水提供群（HT-W群）と7名の飲料水自由摂取群（HT群）に分け、正常血圧者（NT群）8名を対照に登山中の血圧について検討した。登山に要した時間は約7時間で各群に差はなかった。飲水量はHT-W群4000ml、NT群1138 ± 366ml、HT群1450 ± 832mlであった。登山後の体重は、NT群-1.0 ± 0.7kg、HT群-1.1 ± 0.4kg、HT-W群-0.1 ± 0.7kgとHT-W群は他の2群に対し、低値を示した（ $p < 0.05$ ）。反復測定分散分析の結果、登山中の心拍数は群間に有意な主効果が認められ（ $p < 0.05$ ）、HT群 > HT-W群 > NT群の順に高い心拍数で行動していることが認められた。登山中の血圧はSBP、DBPともに、群間と時間要因に有意な主効果認め（ $p < 0.05$ ）、HT-W群 > HT群 > NT群の順に高い血圧で行動していた。したがって、登山中、自由摂取されている程度の水分摂取量では循環血液量の低下とこれに伴う心拍出量の低下から、血圧の低下と心拍数の上昇をもたらす可能性が示唆された。