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Backpacking Normalizes Lipids without Medication: A Case Study on the Appalachian Trail

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ABSTRACT

DeVoe D, Lipsey T, Womack C. Backpacking Normalizes Lipids without Medication: A Case Study on the Appalachian Trail. **JEPonline** 2014;17(4):10-14. The purpose of this case study was to determine if the physical activity associated with a long distance backpacking trip has a favorable influence on the blood lipid profile relative to future risk of coronary heart disease. The subject was a 56-yr-old male who backpacked 112 days on the Appalachian Trail. Assessment of body fat (%) by dual-energy X-ray absorptiometry and blood work after a standard 12-hr fast were determined pre-hike, during the hike, and post-hike. Pre-hike to day 60 differences showed decreases in body weight from 89.4 kg to 75.1 kg and percent body fat from 32% to 18%. The post-hike body weight of 71.2 kg demonstrated a continuing but slower reduction than pre-hike to day 60 and a body fat (18%) that stabilizes during the 112-day hike. Pre-hike to day 60 differences showed a decrease in fat mass (-54%) and a slight increase in lean muscle mass of +1.5%. Fat mass stabilized during the expedition while lean mass decreased -6.5% from day 60 to post-hike. Pre-hike to day 60 resulted in an 85% decrease in triglycerides, a 38% decrease in total cholesterol, a 54% increase in high density lipoprotein, a 49% decrease in low density lipoprotein, a 67% decrease in the LDL/HDL ratio, and a 60% decrease in the cholesterol/HDL ratio. Between Day 60 and post-hike, there were no further decreases in blood lipids and lipoproteins. These findings indicate that backpacking has a positive impact on body composition and weight, which in turn clinically normalized the subject's blood lipids and lipoproteins without medication.

Key Words: Backpacking Trip, Physical Activity, Lipids, Lipoproteins

INTRODUCTION

An estimated 82.6 million American adults (>1 in 3) have 1 or more types of cardiovascular disease. Of these diseases, 40.4 million are estimated to be >60 yrs of age (1). Many of these older Americans have less than optimal lipid and lipoprotein levels that are known risk factors (e.g., physical inactivity and sedentary lifestyle). In fact, a consensus exists that health is a primary reason American adults engage in outdoor physical activity. Backpacking, in particular, has a rapidly growing group of participants interested in regular activity (8). Hiking and backpacking are popular, low-cost, relatively safe forms of activity that are associated with a lower risk of injury when compared to activities such as running and sport participation, and both are available to the vast majority of the general public. Hiking and backpacking are among many outdoor activities are the most popular and fastest growing outdoor recreational activities in the United States.

In 2002, 73 million (34.5%) people in the United States hiked, and 24 million (11.5%) backpackers spent an average 17 days a year in the wilderness (8). The Appalachian Trail is a continental-scale wilderness pathway set aside by the Congress and the National Park Service for foot-travel only, lying within a day's drive of 67% of America's population. The Appalachian Trail Conservancy (1) estimates that 3 to 4 million visitors hike a portion of the Appalachian Trail each year with almost 3,000 yearly reported long distance backpackers. Most of these reported long distance backpackers are less than 25 or greater than 45 yrs of age. As one might expect for activities that require significant physical exertion, participation is greatest for the young and decreases with age, but people over 50 are well represented with 1.6 million backpackers (8). In addition, with the increasing number of 78 million baby boomers reaching retirement age, a growing number of older people are regularly loading up their backpacks and heading into the wilderness.

Limited studies utilizing different durations and intensities of hiking activity have shown in general a moderate positive effect on metabolic and cardiovascular risk factors. Due to confounding variables that were noted in the studies surveyed, the data inconsistently results in an improvement in blood lipid profiles. Faber et al. (5) reported in 1992 that a 6-wk hike resulted in a decrease in total cholesterol (TC) that was due to a decrease in low density lipoprotein (LDL-C). More recently, in 2006, Greie and colleagues (7) found that hiking for 3 wks at both moderate and low altitude decreased body weight, body fat, waist-circumference, fasting glucose, TC, low density lipoprotein (LDL-C), plasma fibrinogen, resting systolic and diastolic blood pressure while high density lipoprotein (HDL-C) and triglycerides (TG) remained unchanged.

Neumayr et al. (9) concluded that the cardiovascular benefits achieved following 3 wks of hiking are more likely to be the result of regular physical activity than the altitude-specific effect of a mountain environment. A 9-month mountain hiking program of a single weekly hiking session at moderate-intensity activity only during weekends did not improve cardiovascular risk factors in elderly persons with a relatively normal cardiovascular risk profile (6). The effect of prolonged exercise training via backpacking on blood lipids is not well characterized, but the data from an initial investigation (4) demonstrate a marked shift toward a less atherogenic profile after prolonged moderate intensity activity. The observed changes in blood lipids and lipoproteins were considerably more striking than the moderate positive effects found in previous published studies on hiking activity alone.

Backpacking is an activity whereby the sustained moderate intensity of high participation makes it an attractive alternative to other activities to promote cardiovascular health. The purpose of this study was to determine if the physical activity associated with a long distance backpacking trip has a favorable influence on the blood lipids and lipoproteins relative to future risk of coronary heart disease. On the basis of preliminary data (4), it is postulated that the increase in physical activity is

expected to result in favorable changes in body composition and weight, which in turn will decrease TC, LDL-C, TG, and increase HDL-C.

METHODS

Subjects

This study consisted of 1 male subject 56 yrs of age with experience in backpacking [8]. Previously, the subject had completed a long distance hike on the Appalachian Trail of 112 days during which 104 days were spent hiking a distance of 2669 km. The subject began the hike in Georgia on January 5th and finished in the White Mountains of New Hampshire on April 26th. While backpacking during this time period, the subject experienced a wide assortment of environmental conditions and terrain.

Procedures

Baseline measures were conducted 2 days before the start of the hike and post-hike assessments were conducted 2 days after completion of the hike. Assessment of body fat (%) by dual-energy X-ray absorptiometry (Hologic Bone Densitometer Discovery Model) was determined pre-hike, during hiking, and post-hike. Standard fasting (12 hrs) blood work for pre-hike was drawn by Poudre Valley Hospital (Fort Collins, CO), while blood work during the hike and post-hike were drawn at off-site contract laboratories (Harrisonburg, VA and Newton, MA); analyzed by LabCorp (Raritan, NJ).

RESULTS

Pre-hike to day 60 differences showed decreases in body weight from 89.4 kg to 75.1 kg and percent body fat from 32% to 18%. The post-hike body weight of 71.2 kg demonstrated a continuing but slower reduction than pre-hike to day 60 and a body fat (18%) that stabilizes during the 112-day hike. Pre-hike to day 60 differences showed a decrease in fat mass (-54%) and a slight increase in lean muscle mass of +1.5%. Fat mass stabilized during the expedition while lean mass decreased -6.5% from day 60 to post-hike. Pre-hike to day 60 resulted in an 85% decrease in triglycerides, a 38% decrease in total cholesterol, a 54% increase in high density lipoprotein, a 49% decrease in low density lipoprotein, a 67% decrease in the LDL/HDL ratio, and a 60% decrease in the cholesterol/HDL ratio. Between Day 60 and post-hike, there were no further decreases in blood lipids and lipoproteins. These findings indicate that backpacking has a positive impact on body composition and weight, which in turn clinically normalized the subject's blood lipids and lipoproteins without medication.

Table 1. Blood Lipid Profile of a Long Distance Backpacker.

Variables	Pre	Day 60	Pre-Day 60 Difference (% Change)	Post
Triglycerides (mg·dl ⁻¹)	484	73	-411 (-85%)	80
Total Cholesterol (mg·dl ⁻¹)	287	177	-110 (-38%)	196
High Density Lipoprotein (HDL, mg·dl ⁻¹)	46	71	+25 (+54%)	70
Low Density Lipoprotein (LDL, mg·dl ⁻¹)	177	91	-86 (-49%)	110
LDL/HDL Ratio	3.85	1.28	-2.57 (-67%)	1.57
Total Cholesterol/HDL Ratio	6.24	2.49	-3.75 (-60%)	2.80

DISCUSSION

This investigation found large decreases in LDL-C, TG, TC, LDL-C/HDL-C ratio, TC/HDL-C ratio, and a corresponding increase in HDL-C. Of note, the increase in HDL-C was high enough to classify it as a negative risk factor or a protective factor against cardiovascular disease. Physical activity associated with an extended backpacking adventure can positively impact body composition and weight which in turn can significantly reduce and clinically normalize blood lipids and lipoproteins without medication.

Despite the prevalence of backpacking, there has been modest assessment of the health needs of long distance backpackers (2,3,10). Surprisingly, except for the 2009 investigation of a long duration (118 days) backpacking trip (4), no other scientific documentation of the metabolic and physiologic benefits of backpacking long distances over an extended period of time on the cardiovascular disease risk factors (such as dyslipidemia, elevated blood pressure, and high abdominal adiposity) exist in the literature.

The long-term goal of this case study is to determine the efficacy and effectiveness of prolonged walking on lipids and lipoproteins in middle-aged and older adults. The real world efficacy is to counteract the low levels of physical activity that are a pervasive feature of modern lifestyles of the middle-aged and older adult population and promote sustained moderate intensity outdoor activities to attenuate cardiovascular disease risk factors.

CONCLUSIONS

Lowering LDL-C is currently the primary target of therapy for reducing the risk of coronary heart disease in adults. This investigation confirms long distance backpacking can lead to decreases in LDL-C, TG, TC, LDL-C/HDL-C ratio, and TC/HDL-C ratio with a corresponding increase in HDL-C. These findings indicate that the increased physical activity and weight loss (fat mass) resulted in substantial changes in blood lipids and lipoproteins, and that a further reduction in blood lipids and lipoproteins do not continue after the fat mass stabilizes.

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Appalachian Trail Backpacking Gear List. Bear precautions: Though grizzlies are not found here, the average thru hiker is likely to encounter a black bear at some point. The best defense against bears in camp is preparing and storing food properly. Use bear lockers at shelters that provide them and a canister where its use is mandated. If you don't want to use a canister for the whole trail, then hang your food (and anything fragrant) everywhere else you camp. On the trail, make noise to alert bears of your presence and give a bear room to move away if you see one. If the bear doesn't run away, avoid eye contact and back away slowly. Don't run or play dead, even if the bear makes a bluff charge. The Appalachian National Scenic Trail, generally known as the Appalachian Trail or simply the A.T., is a marked hiking trail in the Eastern United States extending between Springer Mountain in Georgia and Mount Katahdin in Maine. The trail is about 2,200 miles (3,500 km) long, though the exact length changes over time as parts are rerouted or modified. The Appalachian Trail Conservancy describes the Appalachian Trail as the longest hiking-only trail in the world. More than 2 million people are said to... We measured 189 serum lipids from 13 lipid classes using shotgun lipidomics in a case-control sample on cognitive decline (matched on age, sex and level of education) nested within the Bordeaux study center (discovery, n = 418). Associations with cognitive decline were investigated using bootstrapped penalized regression, and tested for validation in the Dijon study center (validation, n = 314). To build the case-control study on cognitive decline, we used as primary outcome the change in a composite score of global cognition, including the multiple cognitive domains impaired in dementia. Of course, the study participant (and investigator, natch) wasn't a couch potato before his trip. He was an experienced backpacker, at 49. However, he wasn't an elite athlete either, having a BMI of 29.37 before the trip. True to a resolution, he started out on the Appalachian Trail on Jan 3, finishing on May 1. In total, he hiked from Georgia to New Hampshire, completing 2669km. Anyone who has hiked part or all the AT knows that this is not an insignificant amount of work, even if he wasn't quite Scott Jurek. In doing so, he lost only 11kg, totaling 13% TBW. Devoe D, Israel RG, Lipsey T, Voyles W. A long-duration (118-day) backpacking trip (2669 km) normalizes lipids without medication: a case study. *Wilderness Environ Med.* 2009 Winter;20(4):347-52. [PMID 20030443]. Alroy TT.