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# The Effect of Ephedra and High Fat Dieting: A Cause for Concern!

# A Case Report

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The increased incidence of obesity in the world has resulted in more and more people attempting to lose weight through a variety of diets. Many of these diets employ caloric reduction through the elimination of certain food groups. These diets may initially be associated with weight loss (including water weight) but follow up reports of these diets show high drop out rates, proinflammatory changes which can precipitate heart disease and weight gain following cessation of these diets. Efforts to use prescription anorexic medications have been associated with valvular disease and other health concerns. Dissatisfaction with the medical community and a subsequent increase in the availability of information on the internet, are only two of the reasons why people are looking at alternative medicine to assist with health care issues. This includes the use of herbal supplements for appetite suppression. A review of the literature reveals several problems with some of these supplements, including Ephedra. Potentially serious adverse effects include dysrhythmias, heart failure, myocardial infarction, changes in blood pressure, and death have occurred. Unfortunately, one half of all patients experiencing a myocardial infarction have total cholesterol levels below 150 mg/dL and/or no prior cardiac symptoms. This means that the development of inflammatory changes which can precipitate myocardial infarction may go unnoticed by conventional testing and unless markers of inflammation and coronary perfusion are looked for, changes which can precipitate myocardial infarction may go unnoticed until cardiac injury occurs. The following case presentation shows how an individual with exertional dyspnea and concerned about her weight was affected by both the ingestion of a low-carbohydrate diet and ephedra.

## Introduction

The increased incidence of obesity in the world has resulted in more and more people attempting to lose weight through a variety of fad diets which promise weight loss. Many of these diets employ caloric reduction[1-4] through the elimination of certain food groups (eg, the elimination of carbohydrates), thereby limiting the number of foods available for consumption. These diets may initially be associated with weight loss (including water weight) but follow up reports of

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these diets show high drop out rates, proinflammatory[5] changes which can precipitate heart disease and weight gain following cessation of these diets.

Efforts to use prescription anorexic medications have been associated with valvular disease[6] and other health concerns. Dissatisfaction with the medical community and a subsequent increase in the availability of information on the internet, are only two of the reasons why people are looking at alternative medicine to assist with health care issues. This includes the use of herbal supplements for appetite suppression. A review of the literature[7-9] reveals several problems with some of these supplements, including Ephedra. Potentially serious adverse effects include dysrhythmias, heart failure, myocardial infarction, changes in blood pressure (both hypotension and hypertension) and death have occurred.

Unfortunately, one half of all patients experiencing a myocardial infarction have total cholesterol levels below 150 mg/dL and/or no prior cardiac symptoms. This means that the development of inflammatory changes which can precipitate myocardial infarction may go unnoticed by conventional testing and unless markers of inflammation[10] and coronary perfusion are looked for, changes which can precipitate myocardial infarction may go unnoticed until cardiac injury occurs. With the addition of technetium-99m isotopes,[11-12] coronary artery disease can be determined more accurately prior to the development of coronary lumen disease.[13] The following case presentation shows how an individual with exertional dyspnea and concerned about her weight was affected by both the ingestion of a low-carbohydrate diet and ephedra.

## Case Report

The following case reflects the efforts of a 45-year-old Caucasian female to lose weight using Ephedra and a low carbohydrate, high saturated fat diet. On the 11th of February 2000 she was seen for shortness of breath with exertion and her weight at that time, as shown in Table I, was 131 pounds with a normal BMI of 24.5. Several of her

**Table I.** Cardiovascular disease risk factors, height, weight and BMI.

| Result | 2-11-2000 | 8-11-2000 | 3-7-2001 | 12-2-2002 |
|---|---|---|---|---|
| Height (in) | 62 | 62 | 62 | 62 |
| Weight (lbs) | 131 | 130 | 127½ | 130 |
| BMI | 24.5 | 24.3 | 23.9 | 24.3 |
| C-RP (<0.5) | 0.4 | 0.3 | 0.2 | 0.1 |
| Homocysteine (4–12) | 3.8 | 4.0 | 3.7 | 8.1 |
| Fibrinogen (150–400) | 360 | 362 | 358 | 356 |
| Lp (a) (<30) | 60 | 44 | 41 | 24 |
| IL-6 (<9.8) | 6.2 | 6.8 | 6.7 | 5.3 |
| Triglycerides (<150) | 54 | 33 | 55 | 55 |
| VLDLc (<30) | 11 | 7 | 11 | 11 |
| Total Cholesterol (<150) | 264 | 166 | 156 | 172 |
| LDLc (<100) | 188 | 84 | 86 | 83 |
| HDLc (>45) | 65 | 75 | 59 | 78 |
| TC/HDLc | 4.1 | 2.2 | 2.6 | 2.2 |

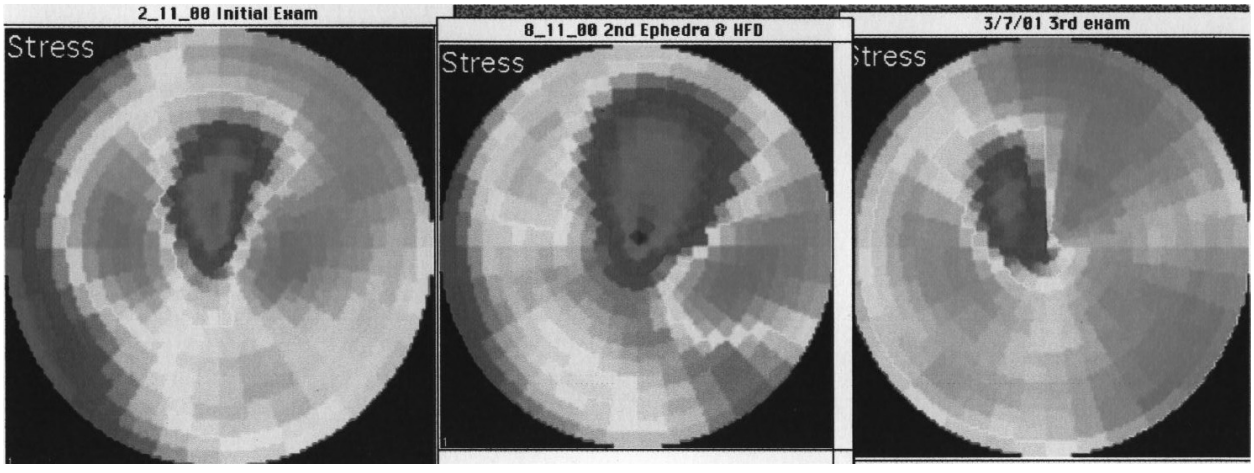
cardiovascular (CV) disease risk factors are shown in Table I. At that time she underwent myocardial perfusion imaging (MPI),14-15 with the results of "stress" perfusion imaging displayed in Figure 1. The results of the MPI revealed ischemic coronary artery disease in the myocardium supplied by the left anterior (LAD) descending artery. She had a normal BMI and her only elevated CV risk factor included her total cholesterol, low-density lipoprotein cholesterol and lipoprotein "a" [Lp(a)]. She was placed on lovastatin by her primary care physician (PCP) in an effort to reduce both her Lp (a) and cholesterol levels.

During the next 6 months she elected to try to lose additional weight by starting a high fat low carbohydrate diet and began exercised daily at a gym. She noticed increased fatigue and began taking an over-the-counter (OTC) supplement to increase her energy level and assist with weight loss. The OTC compound contained Ma Huang (ephedra). By the time she returned to see us, she had been taking the ephedra for 4–5 months and had been following the low carbohydrate diet for 6 months. As shown in Table I, she lost only 1 pound during these 6 months. While her cholesterol and Lp (a) levels improved, results of her myocardial perfusion imaging (MPI) study completed on the 11th of August 2000, revealed a worsening/progression of myocardial perfusion defect as shown in Figure 1.

After her initial MPI, her daily caloric intake had decreased to an average of 1100–1200 kilocalories per day. Further efforts to limit her caloric intake was associated with increased her fatigue, prompting her to use an OTC herbal supplement, Ephedra. While unavailable in the state where she resided, she drove less than 10 miles to another state where she was able to purchase it without problem. After discussing the findings of the second study with her and my concern and surprise that the coronary blood flow has worsened by perfusion imaging, she admitted to having changed both her diet and starting the herbal supplement. Given the results of worsening inflammation as shown best by the increase in interleukin-6 (IL-6)10,16, and MPI, she discontinued both the ephedra and high-fat diet in favor of a balanced diet regimen.

Seven months later she returned to determine the effect of the new diet and lifestyle, along with

**Figure 1.** Myocardial perfusion imaging.
Myocardial perfusion imaging[11,13,15] using high-dose dipyridamole and the isotope sestamibi is used to determine coronary perfusion blood flow in a 46-year-old Caucasian female. The first study was performed on the 11th of February 2000. The region of green in the center of the field demonstrates disease in the left anterior descending artery. The second study completed on the 11th of August 2000 reveals worsening of coronary artery disease as shown by a larger region of green and the presence of blue in the center of the image. A third and final study performed on the 7th of March 2001 shows significant improvement in coronary blood flow after both the low carbohydrate, high fat diet and ephedra are stopped.



the discontinuation of the Ephedra. The results of her CV disease risk factors and her coronary perfusion blood flow are shown in Table I and Figure 1, respectively. As shown in Table I, her weight was 127½ pounds on the 7th of March 2001. She continued to show improvement in her lipid levels and Lp (a), although it took another nine months before her IL-6 levels showed improvement. Her coronary perfusion blood flow showed improvement once she stopped the low carbohydrate diet and Ephedra supplement, as seen in the final MPI study shown in Figure 1.

Following the cessation of the low carbohydrate diet and Ephedra, she noticed an improvement in her energy level. Following the third set of blood tests and the result of her third MPI, her PCP discontinued the statin. She continued to maintain a balanced diet and exercise regimen during the next nine months and while she returned to a weight of 130 by the 2nd of December 2002, her lipid levels and Lp (a) levels remained below their initial values without the concomitant use of statin medications.

## Discussion

Given the current epidemic of obesity and weight problems in the United States and throughout the world, more and more people are seeking rapid weight loss through the use of popular diets and/or the use of anorexic medications (prescription and OTC) which promise to help them overcome their weight problems. The pharmaceutical industry has and continues to invest a significant amount of money into research for new medications designed to target leptin17 and other hormones 18 which when manipulated may aid in weight loss. Despite the potential promise and commercial profit, there is little information suggesting that this approach will in the end be beneficial. In fact, the overwhelming evidence indicates that this approach5,6 will prove to be disastrous. This clinical example serves to emphasize the underlying problem behind such approaches. Failure to look at the consequence of fad diets and anorexic medications has lead to repeated problems with people experiencing heart disease, including heart attacks and in some instances death. These findings support the need for caution when addressing the treatment of obesity and the role of inflammation and heart disease.

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