Supplementation with a juice powder concentrate and exercise decrease oxidation and inflammation, and improve the microcirculation in obese women: randomised controlled trial data

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BACKGROUND

- Increased consumption of fruit & vegetables and exercise ameliorate side effects of obesity through the improvement of:
  - Markers of redox biology
  - Low-grade inflammation
  - Circulation
- Obesity and sedentary lifestyle are associated with:
  - Increased oxidative stress
  - Inflammation
  - Vessel dysfunction

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AIM

The aim of this study was to evaluate the effects of an 8-week supplementation with an encapsulated fruit, vegetable and berry (FVB) juice powder concentrate and a single bout of controlled walking on oxidation, inflammation and skin microcirculation in overweight and obese women.

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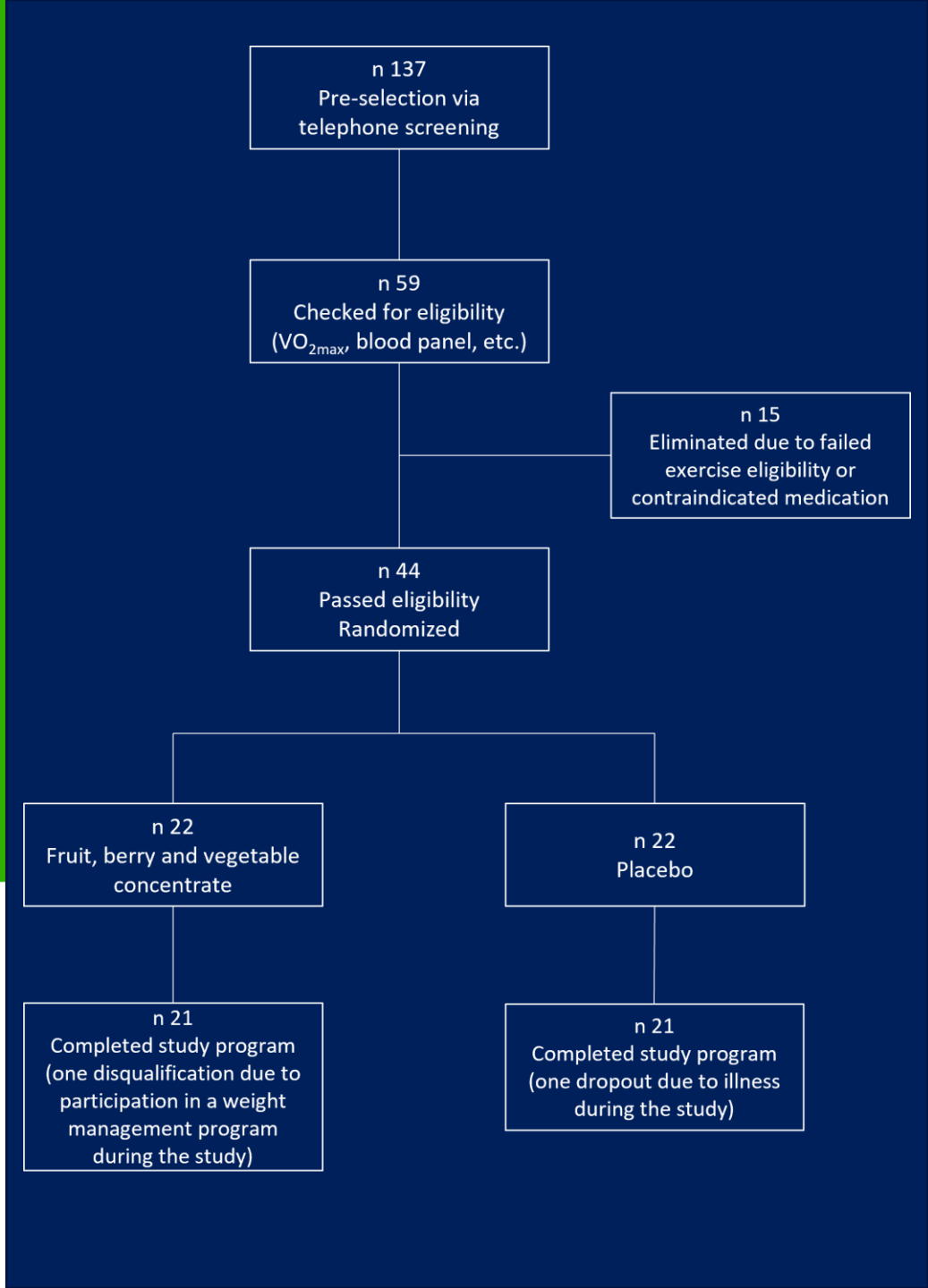
METHODS

Randomized, double-blind, placebo-controlled study

- 42 overweight and obese, pre-menopausal, non-smoking women (41 ± 5 years)
- Supplementation: 8 weeks with FVB (Juice Plus+) 3 caps twice/day or placebo
- Blood samples at baseline and end of study



METHODS

The following markers were assessed:

- **Oxidative stress markers:**
  - Carbonyl proteins
  - Oxidized LDL
  - Cholesterol
  - Total oxidation status of lipids
  - Malondialdehyde
- **Inflammation markers:**
  - TNF-alpha
  - IL-6
- **Microcirculation markers:**
  - Capillary blood flow
  - Oxygen saturation of hemoglobin
  - Relative hemoglobin concentration

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MAIN RESULTS

After 8 weeks of supplementation:

- The FVB group had a significant reduction in carbonyl proteins, oxidized LDL, total oxidation status and TNF-alpha, compared to placebo.
- Markers of skin microcirculation increased significantly in the FVB group compared to placebo.
- Moderate exercise increased capillary blood flow and relative concentration of hemoglobin (markers of circulation) in both groups but did not affect oxidation or inflammation.

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CONCLUSION

"Compared with placebo, 8 weeks of supplementation with FVB decreased the markers of systemic oxidation and inflammation. Both FVB supplementation and a single walking bout improved the markers of the microcirculation in these obese women."

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Supplementation with a juice powder concentrate and exercise decrease oxidation and inflammation, and improve the microcirculation in obese women: randomised controlled trial data

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Abstract

Obesity and sedentary lifestyle are associated with increased oxidative stress, inflammation and vessel dysfunction. Previous research has shown that an encapsulated fruit/berry/vegetable juice powder (FBV) supplement or controlled exercise training improve the markers of redox biology, low-grade inflammation and circulation. The aim of the present study was to assess the effects of 8 weeks of supplementation with FBV or placebo, and a single bout of controlled walking on the markers of oxidation, inflammation and skin capillary microcirculation in forty-two obese pre-menopausal women (41 (SD 5) years, non-smokers and BMI 34·5 (SD 3·8) kg/m^2) using a randomised, double-blind, placebo-controlled design. All assessments were made before and after 8 weeks of capsule supplementation, and pre- and post-30 min of controlled treadmill walking at 70 % of VO_{2max}. Venous blood was collected for the determination of carbonyl proteins (CP), oxidised LDL (ox-LDL), total oxidation status (TOS) of lipids, malondialdehyde, TNF-α and IL-6. Capillary blood flow, O_2 saturation of Hb (SO_2Hb) and the relative concentration of Hb (rHb) were assessed at a 2 mm skin depth. Following 8 weeks of supplementation, compared with placebo, the FBV group had a significant ($P<0·05$) reduction in CP, ox-LDL, TOS and TNF-α, and a significant increase in blood flow, SO_2Hb and rHb. Independent of supplementation, moderate exercise significantly increased blood flow and rHb, with a trend towards increased SO_2Hb. Compared with placebo, 8 weeks of supplementation with FBV decreased the markers of systemic oxidation and inflammation. Both FBV supplementation and a single walking bout improved the markers of the microcirculation in these obese women.

Key words: **Dietary supplements: Exercise and obesity: Oxidation and inflammation: Skin microcirculation**

In recent decades, increasing prevalence of obesity has become a serious public health concern. Suboptimal dietary habits coupled with a sedentary lifestyle are thought to be major contributors to this situation. Overweight and obesity are associated with irregularities in redox homeostasis, imbalanced pro-inflammatory and anti-inflammatory states and microcirculatory dysfunction[1–3]. Reactive Oxygen and Nitrogen species and pro-inflammatory cytokines from both visceral and subcutaneous fat compartments are implicated in increased cardiometabolic disease risk[4,5]. Recent research has shown that obese people have structural and functional alterations in skin microcirculation, which are proportional to the increase in the degree of global and central obesity[6]. Hence, diets rich in antioxidants and anti-inflammatory nutrients, as well as physical exercise, are of interest to combat some of the detrimental side effects of overweight and obesity.

It has been reported that increased consumption of fruits and vegetables improves the body's antioxidant and anti-inflammatory capacities[7–9]. Nutraceuticals providing phytochemicals and vitamins, such as an encapsulated fruit and

Abbreviations: CP, carbonyl proteins; FBV, fruit, berry and vegetable juice powder concentrate; MDA, malondialdehyde; ox-LDL, oxidised LDL; rHb, relative Hb concentration; SO_2Hb, O_2 saturation of Hb; TOS, total oxidation status of lipids; VO_{2max}, maximum O_2 uptake.

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