The Science Behind Curves: We Got the Data!

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Diane Magazine

Overview

- Curves I Update
- Curves II Preliminary Results
- Long-Term Study Preliminary Results
- Planned Studies
- How to Optimize Curves
- Quiz

Experimental Design

- 10-week weight loss program and 4-week maintenance program
- Subjects were assigned to following groups based on baseline testing and responses to CHO tolerance questionnaire using Curves principles
  - No Diet or Exercise (Control)
  - Exercise + No Diet (ND+e)
  - Exercise + High Calorie Diet (HCD)
  - Exercise + High CHO Diet (HCHO)
  - Exercise + Moderately High Protein Diet (HP)
  - Exercise + Very High Protein Diet (VHP)

Curves I

- Preliminary analysis on 120 subjects indicated that Curves Works!
- Final results of Curves I are more impressive!
- Study finished with 160 women who were:
  - 38.6±9 yr
  - 64.2±3 in
  - 94.0±19 kg (207±42 lbs)
  - 43.8±4.3 % body fat (DEXA)
  - BMI of 35.6 (Very High Risk)

Dietary Intervention

Patterned After Curves Phases

- High Calorie Diet (n=11)
  - Women ≤ 90% of estimated REE (Wang et al AJP. 279: E539-45, 2000)
  - Phase I – 2,600 kcal/d for 2 W (55% CHO, 15% PRO, 30% F)
  - Phase II – 2,600 kcal/d for 8 W (40% CHO, 30% PRO, 30% F)
  - Phase III – 2,600 kcal/d for 4 W (55% CHO, 15% PRO, 30% F)

- High Carbohydrate Diet (n=32)
  - Phase I – 1,200 kcal/d for 2 W (55% CHO, 15% PRO, 30% F)
  - Phase II – 1,600 kcal/d for 8 W (55% CHO, 15% PRO, 30% F)
  - Phase III – 2,600 kcal/d for 4 W (55% CHO, 15% PRO, 30% F) and 1,200 kcal/d (55% CHO, 15% PRO, 30% F) for 3/2, 3/2, 5/2, & 10 days
**Dietary Intervention**

**Patterned After Curves Phases**

- **Moderately High Protein Diet** (n=28)
  - Phase I – 1,200 kcal/d for 2 W (20% CHO, 50% PRO, 30% F)
  - Phase II – 1,600 kcal/d for 8 W (15% CHO, 55% PRO, 30% F)
  - Phase III – 2,600 kcal/d for 4 W (55% CHO, 15% PRO, 30% F) and 1,200 kcal/d (20% CHO, 50% PRO, 30% F) for 3/2, 3/2, 5/2, & 10 days

- **Very High Protein Diet** (n=35)
  - Women positive on CHO tolerance questionnaire
  - Phase I – 1,200 kcal/d for 2 W (7% CHO, 63% PRO, 30% F)
  - Phase II – 1,600 kcal/d for 8 W (15% CHO, 55% PRO, 30% F)
  - Phase III – 2,600 kcal/d for 4 W (55% CHO, 15% PRO, 30% F) and 1,200 kcal/d (7% CHO, 63% PRO, 30% F) for 3/2, 3/2, 5/2, & 10 days

**Training Program**

- Standard Curves 30-minute program performed 3 d/wk
- Workouts were monitored
- Women were required to make up missed workouts
- Training compliance was ~98±1%

**Assessments**

- At 0, 2, 10, 10.4, & 14 W:
  - Dietary Records (4-d)
  - Psychometric Tests
  - Body weight
  - Body Composition/Bone Density (DEXA)
  - Total Body Water (BIA)
  - Hip & waist measurement
  - Resting HR & BP
  - Fasting Blood Samples (12h)
  - Resting Energy Expenditure (REE)

**Curves I Results**

- Body Composition
- Resting Energy Expenditure
- Fitness / Health
- Hormones
- Psychosocial Aspects

**Assessments**

- At 0, 10, & 14 wks:
  - Maximal Stress Test
  - 1RM Bench Press
  - 80% of 1RM on Bench Press
  - 1RM Leg Press
  - 80% of 1RM on Leg Press
- Side effects were monitored by an RN on a weekly basis

**Body Composition**

- After 14 weeks:
  - Control (0.8±2.6 kg)
  - ND+E (-0.4±2.1 kg)
  - HCD (-1.1±3.1 kg)
  - HCHO (-4.0±3.1 kg)
  - HP (-4.0±3.8 kg)
  - VHP (-5.7±4.3 kg)
- Program promotes weight loss
- Greatest loss seen in VHP group

n = 160
**Body Composition**

- After 14 weeks:
  - **Control** (0.4±2.7 kg)
  - ND+E (-0.9±1.8 kg)
  - HCD (-0.9±3.0 kg)
  - HCHO (-2.9±2.8 kg)
  - HP (-2.9±3.2 kg)
  - **VHP** (-4.1±3.7 kg)

- No weight regain
- Greatest loss seen in the VHP group

**Anthropometric**

- After 14-weeks, subjects experienced a significant decrease in:
  - Waist (-6.2±7 cm)
  - Hip (-3.6±7 cm)
  - Waist to Hip Ratio (-0.03±0.08)

- CV risk ratio decreased from 0.84±0.09 (Very High Risk) to 0.81±0.05 (High Risk)

**Health Markers**

- **RHR** (-3.3±17%, p=0.03)
- **RSBP** (-2.8±10%, p=0.04)
- **RDBP** (-3.6±12%, p<0.02)

- **Total CHL**
  - 2 wks (-8.5±12 %)
  - 10 wks (-4.5±12 %)
  - 10.4 wks (-5.0±12 %)
  - 14 wks (-1.6±13 %)

- **LDL-c**
  - 2 wks (-7.4±19 %)
  - 10 wks (-2.4±21 %)
  - 10.4 wks (-4.3±21 %)
  - 14 wks (-1.1±21 %)

**Fitness**

- **1RM bench press**
  - (18.5±34% vs 5.0±14%)
- **1RM leg press**
  - (19.1±25% vs 9.4±20%)
- **BP lifting volume**
  - (33.7±85% vs 10±34%)
- **LP lifting volume**
  - (40.6±87% vs 7.7±32%)
- **Peak oxygen uptake**
  - (14±48% vs 1.9±17%)

- Program increases strength, endurance and aerobic capacity

**Resting Energy Expenditure**

- After 10 wks, **REE increased**:
  - **Control** (0.1±3.1 kcal/kg/d)
  - ND+E (1.0±1.2 kcal/kg/d)
  - HCD (4.1±2.3 kcal/kg/d)
  - HCHO (1.5±2.6 kcal/kg/d)
  - HP (1.5±2.6 kcal/kg/d)
  - **VHP** (0.4±2.3 kcal/kg/d)

- **REE increased further during 4-wk maintenance phase**
- Increases in **REE important for weight loss**

**Health Markers**

- Leptin regulates appetite and is correlated with obesity
- After 2 wks, leptin levels significantly decreased (-27.3±32 %).
- Leptin levels were significantly lower than controls at 10-weeks
**Health Markers**

- Leptin levels significantly correlated (p<0.05) with body mass, fat mass, and body fat
- Reductions in leptin levels may help maintain weight loss by hormonally suppressing appetite
- Look to Diane for more details

**Psychosocial Markers**

- After 10 & 14 wk, sig. differences observed in:
  - Physical functioning (6.7±22; 9.3±19)
  - Bodily pain (6.1±30; 4.9±25)
  - General health (8.3±14; 8.4±15)
  - Vitality (11.2±15; 11.9±14)
  - Mental health (6.3±13; 7.3±14)
  - Role emotional (-13.2±43; -16.5±44)
  - Social functioning (NS)

**Psychosocial Markers**

- Changes were not correlated with changes in body weight, body composition, strength, or fitness.
- Results indicate improved quality of life that is apparently independent to weight loss
- May be reason for good compliance with Curves

**Curves I Research Findings**

- Program is highly effective in promoting weight loss and improving general health & fitness in women
- Improvements appear to be due to combination of exercise training and diet interventions which increase REE and reduce the appetite hormone leptin

**Curves I Research Findings**

- Intermittent dieting appears effective to maintain and/or promote additional weight
- Program also promotes improvements in body image, self-esteem, and quality of life that appears to be independent to weight loss

**We Got the Data!**

**Curves Works!**
Curves II

- 14 wk replication study
- 180 overweight but healthy women
- Research Modifications
  - 1 week phase I diet (1,200 kcals/d) instead of 2 weeks
    - More manageable
    - Wanted to minimize decrease in REE observed during the first 2-weeks in the first study

Curves II

- Research Modifications
  - Free living maintenance
    - 2,600 kcals/d
    - Diet (1,200 kcals/d) only if they gained 3 lbs
    - More consistent with Curves program
- Identical training & diet
- Identical assessments

** Preliminary Results **

Curves II

- Body Mass

Curves II

- Fat Mass

Curves II

- Body Fat

Curves II

- Resting Energy Expenditure

** Preliminary Results **

n = 110
n = 59
Curves II

Resting Energy Expenditure

- Metabolism increased without gaining weight
- More impressive increase in REE during maintenance phase
- Dr. Mary Nelson from Tufts University was quoted as saying “Gary Heavin says you can raise metabolic rate by eating and intermittent dieting. You Can’t!.......
- Here’s another study showing YOU CAN!

Curves Works!

One Week Low-Calorie Diet & Free Living Maintenance Phase

Curves One-Year Extension

- Subjects who completed the 14-wk study were invited to continue to train and/or diet for one-year
- Assessments were performed at 3, 6, 9, and 12 months after completing the 14-wk study

Curves One-Year Extension

- Goal was to determine if women who continued program would be able to maintain weight loss compare to those who did not.

Curves Long-Term Study

Weight Loss

n = 59

** Preliminary Results **

Curves Long-Term Study

Weight Loss

n = 43

** Preliminary Results **
Curves Long-Term Study

Weight Loss

Body Mass

n = 35

** Preliminary Results **

Curves Long-Term Study

Weight Loss

Body Mass

n = 23

** Preliminary Results **

Case Study - 45 yr Female

Week 0
193 lbs, 41% BF

Week 14
169 lbs, 32.5% BF

12 Months Later
145.5 lbs, 28.6%

Curves Works!

Long-Term Weight Loss & Weight Management

Other Studies

• Women’s Health Initiative
  – Effects of Calcium Supplementation on Weight Loss in Post-Menopausal Women Participating in the Curves Fitness & Weight Loss Program
  – Effects of Post-Exercise Protein Supplementation on Training Adaptations to the Curves Fitness

• Women’s Health Initiative
  – Biomechanical Analysis of Curves Equipment
  – Energy Expenditure Analysis of Curves Circuit
  – Curves in Middle Schools
Curves Research Impact

- Research presented at leading scientific meetings
- Abstracts published in quality scientific journals
- Research findings highlighted in numerous fitness magazines, newspaper articles, and on local and national news shows

Curves Research Impact

- Several research teams are now looking at Curves fitness and weight loss methods
- Revolutionizing how America thinks about diet and exercise!

Curves Works!

Can we make it better?

Optimizing Curves

- Provide a caring and nurturing environment for members
- Ensure proper exercise intensity and progression
- Encourage clients to follow the diet if they want to lose weight

Optimizing Curves

- Once goal weight is achieved, they must continue to train and diet if they gain weight (3 lbs)
- Encourage involvement in recreational activities
- Add nutritional strategies to optimize recovery, protein synthesis, and fat loss

Nutritional Strategies to Optimize Curves Results

- Daily Multivitamin
- Post-Exercise Protein
- Calcium
- Health Support
  - Joint Support
  - Fem Support
  - Glucose Management
**Post-Exercise Protein**

- Meal timing plays an important role in optimizing training adaptations and recovery.
- Ingesting a light carbohydrate/protein snack prior to exercise can reduce the catabolic effects of exercise.

**Post-Exercise Protein**

- Ingesting protein and/or essential amino acids (EAA) after exercise stimulates protein synthesis.
- Theoretically, ingestion of protein within 30 minutes after exercise would enhance protein synthesis, help repair and build muscle, and improve training adaptations.

**Post-Exercise Protein**

- Esmarck et al (J Physiol. 535:301-311, 2001) found that ingesting EAA with CHO immediately after resistance exercise promoted two times greater training adaptations compared to waiting until 2-hr to consume the supplement.
- Most sport nutritionists recommend ingesting CHO & PRO after exercise.

**Post-Exercise Protein**

- The Curves protein shake is an excellent source of whey and soy protein which are rich in EAA.
- Ingestion of the Curves protein shake immediately after exercise can help build muscle which can help promote and/or maintain weight loss.

**Calcium & Weight Loss**

- High dietary calcium has been shown to inversely correlate with body weight and body fat (i.e., the higher the calcium in the diet the lower the body weight and fat mass).
- People with low dietary calcium levels typically have high levels of calcium, 1,25-dihydroxy-vitamin D, and calcitriol levels in their fat cells.

**Calcium & Weight Loss**

- Intracellular calcium in fat cells stimulates lipid gene expression and storage of fats as TG’s.
- High dietary calcium has been shown to inversely correlate with body weight and body fat (i.e., the higher the calcium in the diet the lower the body weight and fat mass).
Calcium & Weight Loss

- Increasing dietary calcium decreases 1,25-dihydroxy-vitamin D and calcitriol in fat cells and therefore inhibits fat formation.
- Some have theorized that increasing dietary calcium can help prevent fat storage and/or promote fat loss.

Calcium & Weight Loss

- Zemel et al ([Clin Nutri](https://www.ncbi.nlm.nih.gov/pubmed/11288385) 75(2):S342-3, 2002) reported that supplemental calcium (800 mg/d) or high dietary intake of calcium (1,200 – 1,300 mg/d) during a 24-week weight loss program promoted greater weight loss (26-70%) and fat loss (38-64%) compared to subjects on a low calcium diet (400-500 mg/d).

Calcium & Weight Loss

- Calcium is good for your bones and waistline!
- Currently conducting a study to determine whether calcium supplementation in post-menopausal women participating in the Curves program would promote greater fat loss
- Strongly recommend calcium supplementation for Curves

Science Behind Curves Quiz

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<tr>
<td>Weight</td>
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<td>Body Fat</td>
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<td>REE</td>
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<td>Waist &amp; Hip Circumferences</td>
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<td>Most Effective Diet</td>
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<td>Muscular Strength / Endurance</td>
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We got the data!

Curves Works!

Department of Health, Human Performance & Recreation’s
Women’s Health Initiative

Research that’s making a difference!

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We Got The Beat!
CURVES 2004 FRANCHISE CONVENTION