Content available at: https://www.ipinnovative.com/open-access-journals

IP Journal of Nutrition, Metabolism and Health Science

Journal homepage: https://www.jnmhs.com/

Case Report

Changes in body composition and physical performance in peri and post-menopausal women following a ketogenic diet and functional fitness program

Bronson K Dant [1,*]

[1] *Ultimate Ketogenic Fitness, Operations*

ARTICLE INFO

Article history:
Received 08-08-2022
Accepted 12-08-2022
Available online 09-09-2022

Keywords:
Ketogenic diet
Functional fitness
Menopause
Low carb diet
Resistance training
Protein

ABSTRACT

There is evidence that Functional Fitness Training (FFT) can improve lean mass and work capacity in individuals. There is more information being discovered about the potential benefits of a whole food, low carb, Ketogenic Diet (KD) on the improvement of lean mass and reduction of adipose tissue. This report provides data on 24 women between the ages of 45 to 59, who reduced their carbohydrate intake, increased their protein intake, and performed FFT activities regularly. These women followed a specific set of nutrition and fitness guidelines for 8 weeks and recorded their food intake, physical activity, body composition, and performance metrics each week. At the end of the 8 weeks there was an overall decrease in body weight and body fat mass with an increase in lean body mass. Each fitness benchmark saw an average increase in performance over the 8 weeks. This study provides insight into the potential for comprehensive programs that include a KD and FFT used as tools that improve the quality of life for women who are peri or post-menopausal.

1. Introduction

Menopause is a natural process that women go through. Unfortunately, it comes with a myriad of physical effects that, if not managed properly, negatively affect quality of life and overall health.[1–3]

A large portion of the physiological effects of menopause come from reduced estrogen which increases visceral fat mass and decreases bone density and muscle mass.[4,5] If these factors are not managed, they can contribute to an overall loss of strength and a reduction in physical activity and general mobility.[3] Not only is physical ability reduced but the reduction of lean mass has an additional impact on hormone management and vasomotor symptoms. Recent studies show there is an association between reduced lean body mass and increased frequency and intensity of hot flashes and night sweats.[6]

The purpose of this study was to examine the effect of a KD and FFT on the body composition and physical ability of women between the ages of 45 to 59, who were peri or post-menopausal.

2. Discussion

The 8-week study was performed remotely using mobile app technology and at-home body composition devices. The 31(24 completed) women who participated were located across the US and ranged from 45-59 years of age.

The body composition data collected was device recorded. The study set specific guidelines for nutrition and provided two options for the participants to engage in functional fitness training. The tracking of data for nutrition and fitness performance was self-reported.

* *Corresponding author*.
E-mail address: bronson@ultimateketogenicfitness.com (Bronson K Dant).

https://doi.org/10.18231/j.ijnmhs.2022.023

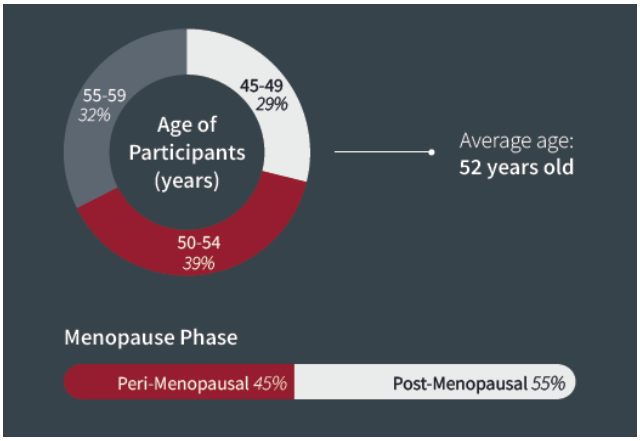

Fig. 1: Participant data image.

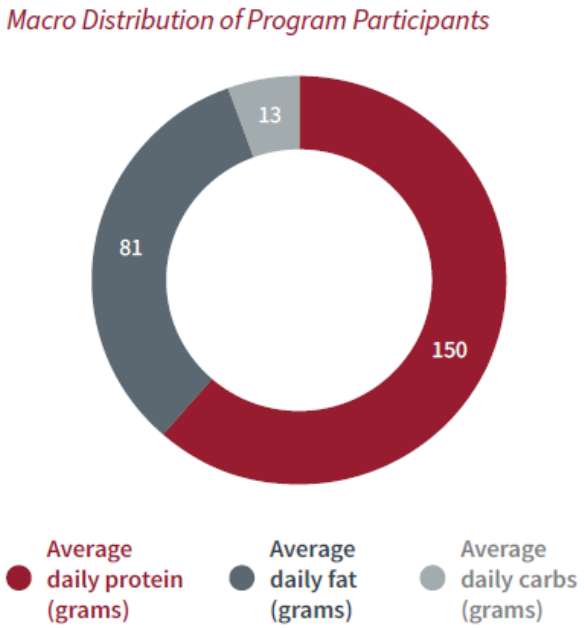

Fig. 2: Macro distribution in grams.

3. Body Composition Devices

Each participant was provided with an at-home body composition scanning device. The InBody (InBody USA, 13850 Cerritos Corporate Drive, Unit C, Cerritos, California 90703) H20N body composition scanner uses bio-electric impedance to determine several metabolic measurements. It is a small device that is used in a person's home to provide trends and information about body composition. The H20N uses a Bluetooth connection to send data to the InBody Mobile App, on an individual's device, which collects and stores the result of scans automatically.

The InBody Mobile App was linked to a larger system where all the data was aggregated and collected for the entirety of the study.

4. Nutrition Plan

The nutrition plan consisted of low carbohydrates, moderate fat, and high protein. Daily macronutrients were calculated using each participant's lean body mass (LBM), not by calories.

Recommendations are determined by taking the LBM of a participant and converting the metrics from pounds to grams. The target ratio for protein was 1:1 grams to pounds of LBM. Fat and carbohydrate numbers are combined and matched 1:1 grams to pounds of LBM. Carbs were limited to 25g, and fat could make up the difference. For example, a participant with 150lbs of LBM has a macro recommendation of 150g of protein, 25g of carbs, and 125g of fat every day. Participants used an online form to record their macro intake each day.

5. Fitness Plan

The fitness plan consisted of high-intensity functional exercises through the Ultimate Ketogenic Fitness (*Ultimate Ketogenic Fitness, 10360 Swift Stream Place, 303, Columbia, MD 21044)* Mobile App. There were two versions of the fitness program participants could choose from. Both programs included a variety of workouts to improve strength, muscular endurance, cardiovascular endurance, mobility, speed, and power. 14 participants did the Beginner program. 10 participants did the Functional Fitness program. The Beginner Program was provided for participants who had little to no experience doing fitness activities or did not have access to adequate equipment. It was bodyweight exercises only. It was programmed for 3 workouts per week.

The Functional Fitness Program was provided for participants who had some experience working out and had adequate equipment. It included dumbbells, kettlebells, medicine balls, etc. It was programmed for up to 5 workouts per week. The participants were only asked to do a minimum of 3 days per week. Participants recorded their performance in the mobile app during each workout. This provided the metrics tracked per workout. The metrics included weight, reps, time, distance, and movement modifications.

6. Process and Operation

The study lasted 8 weeks. Each week the participants would do a body composition scan and attend a group video coaching session. Every day the participants logged their macro intake and if they did a workout, they recorded their performance.

The analysis of the final data is for 24 of the initial 31 participants who completed over 75% of the data entries and recorded final body composition data at the end of the study.

7. Results

The goal of the study is to investigate how body composition and physical performance can be enhanced for women experiencing different phases of menopause. The hypothesis is that following a KD and performing FFT activities will demonstrate a positive change in body composition via the maintenance or increase in lean mass and reduction of body fat mass over the course of 8 weeks.

Additional benefits could be improved strength, stamina, endurance, and mobility. These components of fitness are measured by performance metrics including but not limited to, the amount of weight lifted, the number of reps completed, distance performed in a set time, and progression in more advanced workout modalities. The results of the study are a compilation of the self-reported data collected from the fitness app, macro logs, and the body composition data recorded by the InBody H20N devices.

8. Body Composition

Body composition is a breakdown of six metrics that make up the various tissues of the human body. The In Body H20N provides data on all six metrics.

1. Body Weight
2. Lean Body Mass
3. Body Fat Mass
4. Skeletal Muscle Mass
5. Body Fat Percentage
6. Skeletal Muscle Mass Percentage

Using these metrics, it is possible to determine how a person's metabolic health and physical capacity for work are changing. Basic analysis shows that there was a reduction in overall Body weight (-7.14lbs), Body Fat Mass (-5.8lbs), and Body Fat % (-2.02%). More importantly, there was no significant change in Lean Body Mass.

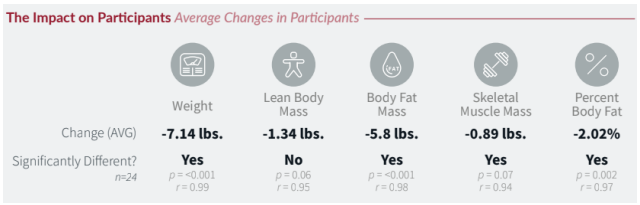

Fig. 3: Body composition changes.

Additionally, skeletal muscle mass percentage increased and was trending upward at the end of the 8 weeks. Skeletal muscle mass percentage is the amount of muscle mass in pounds compared to a person's overall weight (including body fat mass). The recommended target for women is 40%. At the end of the study, the participants averaged a .6% increase. Evaluating the data based on the participants' phase of menopause shows that the post-menopausal cohort lost less body fat but gained more muscle mass.

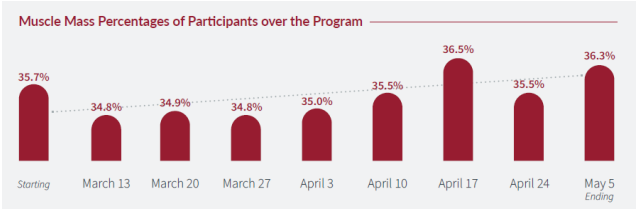

Fig. 4: Skeletal muscle mass changes.

Fig. 5: Body composition changes by menopause phase.

There is no data provided by this study that indicates a relationship between phases of menopause and their effect on the ability to reduce body fat or gain muscle mass. More evaluation and studies are needed.

The results of this study do indicate a benefit from a ketogenic diet on body composition and the potential to aid in the reduction of body fat and maintenance of lean mass. A ketogenic diet could be a beneficial component in helping manage the adverse effects of menopause.

9. Fitness Performance

Each fitness program used a set of workouts to benchmark participants' levels of fitness at the beginning and end of the study. The Beginner program had six benchmark workouts performed in the first and last weeks. There were 3 strength and muscular stamina workouts and 3 metabolic conditioning workouts.

Table 1: Beginner benchmark workouts.

Benchmark	Details
Beginner Strength 1	Max Air Squats in 2:00
Beginner Strength 2	Max Sit-ups in 2:00
Beginner Strength 3	Max Shoulder Taps in 2:00
Beginner Conditioning 1	30 Burpees for Time
Beginner Conditioning 2	Tabata (Mountain Climbers and Jumping Jacks)
Beginner Conditioning 3	Death by Jumping Lunges

The testing at the end of the study for the beginner program resulted in an improvement across the board. This demonstrates an improvement in all aspects of fitness and metabolic health. Each workout saw an improvement in

Table 2: Beginner benchmark workout average results.

Benchmark	Results
Beginner Strength 1	+23.5 Reps
Beginner Strength 2	+9.6 Reps
Beginner Strength 3	+25 Reps
Beginner Conditioning 1	0:49 Seconds Faster
Beginner Conditioning 2	+99 Reps
Beginner Conditioning 3	+2 Rounds

Table 3: Functional fitness benchmarks.

Benchmark	Details
Strength Benchmark 1	Max Reps DB Front Squat
Strength Benchmark 2	Max Reps Push-ups
Conditioning Benchmark	Max Distance in 20:00 (Bike, Row, or Run)
Metcon Benchmark 1	50-40-30-20-10 rep rounds of: Double-Unders or Regular Jump rope Sit-ups
Metcon Benchmark 2	10:00 Time Cap 3 Rounds for Time Run 400 meters (500 Row, 2:00 Jump Rope, 1k Air Bike) 21 KBS 15 Box Jumps
Metcon Benchmark 3	18:00 Time Cap 18:00 EMOM (Alternating) Wall Balls Toes to Bar KB Sumo Deadlift High Pull Ball Slams Double-Unders or Jump Rope Rest
Metcon Benchmark 4	21-15-9 For Time DB Thrusters Pull-ups or Jumping Pull-ups 8:00 Time Cap

Table 4: Functional fitness results.

Benchmark	Results
Strength Benchmark 1	+8.2 Reps
Strength Benchmark 2	+17.5 Reps
Conditioning Benchmark	+329m Increase in Distance
Metcon Benchmark 1	0:15 Seconds Faster
Metcon Benchmark 2	0:53 Seconds Faster
Metcon Benchmark 3	+92 Reps
Metcon Benchmark 4	0:67 Seconds Faster

Table 5: Functional fitness performance increase percentages.

Benchmark	% Performance	Notes
Strength Benchmark 1	+84.42%	40% of the participants performed fewer reps but at a heavier weight on the second benchmark.
Strength Benchmark 2	+54.07%	30% of the participants increased the difficulty of the exercise by progressing the scale to a higher intensity
Conditioning Benchmark	+12.04%	12.04% Increase in the distance across all three modalities.
Metcon Benchmark 1	+5.88%	
Metcon Benchmark 2	+3.05%	30% of the participants increased the difficulty of the exercise by progressing the scale to higher intensity.
Metcon Benchmark 3	+28.57%	20% of the participants increased the difficulty of the exercise by progressing the scale to higher intensity.
Metcon Benchmark 4	+19.04%	30% of the participants increased the difficulty of the exercise by progressing the scale to higher intensity.

the average number of repetitions performed, speed of completion, length of time worked, and metabolic capacity.

Table 2 Shows the increase in repetitions or reduction in time to complete each benchmark workout. This is the difference in performance over the 8 weeks.

The Functional Fitness program used seven benchmark workouts. There were 2 strength workouts, 1 Cardiovascular Endurance workout, and 4 muscular stamina and metabolic conditioning workouts.

The testing at the end of the study for the functional fitness program resulted in an improvement across the board. This demonstrates an improvement in all aspects of fitness and metabolic health. Each workout saw an improvement in the average number of repetitions performed, speed of completion, length of time worked, metabolic capacity, and complexity of movement.

Table 4 Shows the increase in repetition or reduction in time to complete each benchmark workout. This is the difference in performance over the 8 weeks.

Table 5 Shows a dramatic increase in performance across each benchmark. This is further evidence of the impact that a functional fitness program has on physical ability and metabolic function. Additional data analysis on the functional fitness benchmarks shows the percentage of

performance increase and the ratio of participants who improved mobility and neuromuscular factors by increasing the complexity of the exercise they performed. Even in the scenarios where a participant increased the weight or the difficulty of the exercise, there was still an overall increase in the amount of work completed in each benchmark. This indicates that not only was there an improvement in the physiological aspects of fitness but the neuromuscular aspects as well.

The results of participating in a regular program of functional fitness training demonstrate a general improvement in strength, mobility, and physical ability. The average improvement of all metrics indicates that a well-rounded functional fitness program should play a role in the management of the adverse effects of menopause.

10. Conclusions

Menopause is a process that affects every woman. It comes with many symptoms that can negatively impact quality of life and independence. One of the hallmarks of menopause is the changes in body composition and loss of physical ability associated with a reduction in lean mass and an increase of adipose tissue. Managing these changes through a targeted KD and engaging in a FFT can provide benefits that mitigate the symptoms of menopause. KD have been shown to improve body composition by facilitating fat loss and preserving muscle mass in women.[7,8] After 8 weeks of following a KD, the participants of this study lost significant body fat without the loss of lean mass. In most cases, there was an increase in muscle.

FFT is a comprehensive program that has a long history of improving physical ability through the development of several aspects of physiological and neurological components of fitness.[9] Participants who completed at least 3 workouts a week saw an improvement in all of the tested metrics. The results after 8 weeks indicate that regularly participating in functional fitness has a beneficial effect and helps to mitigate the negative impact menopause has on physical ability.

Further research is needed. This study provides insight into the potential for comprehensive programs that include a ketogenic diet and functional fitness to be used as a tool that improves the quality of life for women who are peri or post-menopausal.

11. Source of Funding

None.

12. Conflict of Interest

None.

Acknowledgements

We are grateful to all subjects who gave of their time and effort to participate in this study.

References

1. Florentino, T., & Dant, B. (2022, June 20). A Remote Ketogenic and Functional Fitness Approach to Managing Body Composition Through Menopause. Published by InBody US Inc.
2. Whiteley J, Dibonaventura MD, Wagner JS, Alvir J, Shah S. The impact of menopausal symptoms on quality of life, productivity, and economic outcomes. *J Women's Health*. 2002;22(11):983–90.
3. Maltais ML, Desroches J, Dionne IJ. Changes in muscle mass and strength after menopause. *J Musculoskeletal Neuronal Interact*. 2022;9(4):186–97.
4. Greendale GA, Sternfeld B, Huang MH, Han W, Gutierrez CK, Ruppert K. Changes in body composition and weight during the Menopause Transition. *JCI Insight*. 2019;4(5):e124865.
5. Ko J, Park YM. Menopause and the loss of Skeletal Muscle Mass in women. *Iranian J Public Health*. 2021;50(2):413–4.
6. Woods R, Hess R, Biddington C, Federico M. Association of Lean Body Mass to menopausal symptoms: The study of Women's health across the nation - women's midlife health. *Bio Med Central*. 2020;6:3944.
7. Whiteley J, Dibonaventura MD, Wagner JS, Alvir J, Shah S. The impact of menopausal symptoms on quality of life, productivity, and economic outcomes. *J Women's Health*. 2002;22(11):983–90.
8. Paoli A, Mancin A, Caprio L, Monti M, Narici E, Cenci MV, et al. Effects of 30 days of ketogenic diet on body composition, muscle strength, muscle area, metabolism, and performance in semi-professional soccer players - journal of the International Society of Sports Nutrition. *Bio Med Central*. 2021;18(1):62.
9. Barfield JP, Anderson A. Effect of CrossFit on Health Related Physical Fitness: A pilot study. *J Sport Human Perf* . 2022;2(1):23–8.

Author biography

Bronson K Dant, Coach https://orcid.org/0000-0002-5164-5592

Cite this article: Bronson K Dant. Changes in body composition and physical performance in peri and post-menopausal women following a ketogenic diet and functional fitness program. *IP J Nutr Metab Health Sci* 2022;5(3):124-128.