

Effect of Oral Contraceptives on Changes in Weight and Social Eating Patterns in
Freshman Females

An Honors Thesis (HONORS 499)

by

Danielle Blain

Thesis Advisor: Dr. Jayanthi Kandiah

Ball State University
Muncie, Indiana

May 24, 2007

Date of Graduation: May 5, 2007

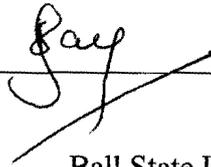
Effect of Oral Contraceptives on Changes in Weight and Social Eating Patterns in Freshman
Females

An Honors Thesis (HONORS 499)

by

Danielle Blain

Thesis Advisor: Dr. Jayanthi Kandiah

A handwritten signature in cursive script, appearing to read "Jay", is written over a horizontal line. The signature is positioned to the left of the center of the line.

Ball State University
Muncie, Indiana

May 24, 2007

Date of Graduation: May 5, 2007

Acknowledgements

- I would like to thank Dr. Jay Kandiah for advising me throughout this project. I learned so much from her about the research process and writing up a manuscript.
- In addition, I would like to thank Diana Jones, MSN, WHCNP for input on the area of oral contraceptives and helping me recruit my participants in the study.
- I would also like to thank Dr. James Jones for analyzing statistical data from my study and checking over my research results in my paper.

ABSTRACT

Context: This randomized study examined if type of oral contraceptives (norgestimate/25 mcg ethinyl estradiol vs. 150 mcg desogestrel and 30 mcg ethinyl estradiol) affected weight gain and changes in social eating habits among freshman college females.

Method: Anthropometrics (weight, height, and blood pressure) and food frequency questionnaires were collected from 69 females (18-24 years) at 0 and 3 months.

Results: Although there was a change in weight, no difference in weight gain and body mass index (BMI) was observed between oral contraceptive users (OC-U) and non-users (OC-NU). Type of oral contraceptive had no effect on the amount of weight gained, BMI, blood pressure, or changes in social eating behaviors.

Conclusion: Type of oral contraceptive had no effect on weight gain or changes in social eating habits in college freshman females.

Keywords: oral contraceptives, social and eating habits, freshman females, weight, blood pressure

1. INTRODUCTION

According to the National Health and Nutrition Examination Survey's 2002 report [1], 64.5 % of American adults are overweight [body mass index (BMI) greater than 25 kg/m²] with the greatest increase in BMI being observed between the ages of 18 and 29 years [2]. The 1995 National College Health Risk Behavior Survey revealed that weight gain in college students was attributed to poor dietary and physical activity patterns [3].

Some of the factors that have been associated to weight gain among college women were a lack of exercise, inadequate consumption of fruits and vegetables, and increase frequency and

consumption of fried foods [3-5]. In addition, a significant increase in alcohol consumption and use of oral contraceptives has been attributed to weight gain [6-7].

Information from the 2002 National Center for Health Statistics showed from a pool of 7,643 women, 19% (15-44 years) were using the pill. It was also found that 82% of those women had used the pill at least once in their lifetime [8]. In addition, when 132 Austrian adolescent females were placed on monophasic pills, sixty-seven (48.2%) girls reported experiencing side effects. In 40 participants weight gain was the most common side effect that was reported [9]. Most studies that investigated the relationship between oral contraceptives and weight gain have examined selective populations such as teenage women (12-17) and those between 15-44 years. To date, no research has looked at the effect of young freshman college women (18-24 years). Therefore, the objective of this study was to examine if the type of oral contraceptives affected weight gain and changes in social eating habits among freshman college females.

2. MATERIALS AND METHODS

This study was conducted at a metropolitan urban university. With the help of the University Women's Health Center, approximately 400 freshman females (200 oral contraceptive users and 200 non-oral contraception users) between 18-24 years were recruited via flyers and email. Criteria for student participation included: i) being free of any metabolic diseases (e.g. hypertension, diabetes, etc.); ii) maintenance of usual exercise, social habits, and eating patterns; iii) avoidance of oral contraceptives prior to the study; and iv) collection of anthropometric measures (height, weight, and blood pressure) at the Women's Health Center. For the oral contraceptive users (OC-U), there were 2 additional criteria, in that the use of oral contraception was mainly to prevent conception and not for other health reasons (e.g. acne,

menorrhagia, PMS, and exercise induced amenorrhea), as well as being placed on either Ortho-Tri-Cyclen Lo or Desogen their freshman year. The Ortho Tri-Cyclen Lo (norgestimate/25 mcg ethinyl estradiol) and Desogen (150 mcg desogestrel and 30 mcg ethinyl estradiol) were selected because they were inexpensive and most commonly prescribed to students. To encourage participation, all potential subjects were sent periodic reminders (once every 2 weeks) to indicate their interest in the study.

After one month, a total of sixty-nine participants responded to the research (n=24 Ortho Tri-Cyclen Lo, n=27 Desogen, and n=18 non-oral contraceptive users). Anthropometric measures and food frequency questionnaires were collected at the start of the study and 3 months. All subjects were determined to be healthy and received medical clearance from the University's Health Services and signed a required consent form prior to participation. Before commencement of the study, the research was reviewed and approved by the University's Institutional Committee on Investigations Involving Human Subjects.

2.1 Height, Weight, and Blood Pressure

At the start of the study (0 months) and at 3 months, height, weight, and blood pressure were taken at the Women's Health Center by the same nurse practitioner. Weight was measured using a SECA™ Digital Scale (www.secacorp.com, 2004). Participants were instructed to empty their pockets and remove their shoes and jackets. They were told to stand erect with their shoulder's leveled and hands to the side and weight distributed evenly on both feet. Each participant was asked to adjust the angle of their head by moving their chin up or down and to look forward. Height was recorded to the nearest ¼ inch and weight to the nearest ¼ of lb. Blood pressure was taken on each participant's left arm using a mercury manometer. The measurement was read to the nearest even millimeter. Body mass index (BMI) was calculated

by dividing body weight in pounds times 703 divided by inches squared to determine if there was a change in weight after 3 months.

2.2 Food Frequency Questionnaire

A twenty-three itemized and validated food frequency questionnaire that addressed eating and socializing patterns was utilized. Validity was administered by giving the questionnaire to four health professionals (i.e. registered dietitian, health statistician, nurse practitioner, and medical director of the Health Center), who examined the questionnaire for content and face validity. Feedback and suggestions were received, and the survey was revised. The modified questionnaire was presented to each participant who took approximately 10 minutes to complete the questionnaire that addressed meal and snack patterns, physical activity, alcohol intake, and frequency of fast food consumption. Anthropometrics and the food frequency questionnaires were assessed at baseline (0 months) and 3 months. To maintain subject anonymity, all participants were assigned a number. To ensure patient acceptance and tolerance, it was mandatory for all oral contraceptive users to obtain a three month checkup prior to obtaining a year long prescription. Thus, the duration of the research was for a period of 3 months.

2.3 Statistical Analysis

Data collected from the two time periods (0 and 3 months) was statistically analyzed using two way ANOVA and Chi Square tests. A p-value of ≤ 0.05 was considered to be statistically significant.

3. RESULTS

Sixty-nine freshman females (18-24 years) successfully completed the study. There were 51 oral contraceptive users (n=24 Ortho Tri-Cyclen Lo; n=27 Desogen) and 18 non-oral

contraceptive users (OC-NU). With the exception of one subject, who was an African American, all the other participants were Caucasian (n=68). Majority of the subjects were either unemployed (n=33, 47.8%) or worked part-time (n=31, 44.9%).

As observed in Table 1, all participants gained weight from baseline to 3 months. However, there was no difference in mean weight gain and BMI between OC-U and OC-NU. Similarly, type of oral contraceptive had no effect on the amount of weight gain and BMI. A two-way repeated ANOVA compared 0 and 3 months measures of the BMI for the three groups (Ortho Tri-Cyclen Lo, Desogen, and OC-NU). For BMI, a main effect was discovered for time ($F_{(1,66)}=11.71, p=.001$), but no effect for the groups, nor interaction was found. From 0-3 months, subjects increased their mean BMI measure from 24.02 to 24.53, an increase in weight of slightly over 3 pounds.

A two-way repeated ANOVA showed a statistical significant change in blood pressure (systolic and diastolic) from baseline to 3 months between the groups over time (systolic: $F_{(2,63)}=2.75, p=.072$; diastolic: $F_{(2,63)}=2.75, p=.072$). As observed in Figure 1, from 0-3 months, OC-NUs had the greatest increase in systolic blood pressure. Although non-oral contraceptive users had increased diastolic blood pressure from 0-3 months, the values were still lower when compared to oral contraceptive users (Figure 2).

Changes in social eating habits were examined from 0-3 months. For the purpose of this study, social eating was defined as frequency of snacking, drinking, eating out, as well as food consumption during dating and when in the company of friends. A Chi square test of association showed there were no statistical significant changes in social eating behaviors that were associated with oral contraceptive use.

4. DISCUSSION

This study demonstrated that type of oral contraceptive had no effect on weight gain. In addition, there was no significant difference in weight gain between oral contraceptive users and non-users. Similar observations have been noted by other researchers [10-11] who found that use of monophasic (20 µg ethinylestradiol and 75 µg gestodene) OCs on 18-45 year old females for a period of 21 days to 6 months had no effect on weight gain. On the contrary, Brunnhuber and Kirchengast found adolescent females (14-18 years) reported gaining weight after one month on a low dose oral contraceptive (20-35 µg ethinylestradiol) [9]. Findings from this study are in congruent with works of other researchers regarding freshman weight gain. Like the current study, Coney et al., showed that type of oral contraceptive (high or low estrogen content) had no significant effect on either body weight or blood pressure [12].

Several studies have found an association between weight gain among freshman students in the first year of college [6, 13-14]. Mean weight gain have ranged from ~7-15 lbs during one year [5, 13-14]. Observations in other studies are similar to the current population in that participants gained an average of 3 lbs in 3 months [13]. Possible explanations for weight gain may be due to increased alcohol intake, altered sleep patterns, increased stress, decreased physical activity, and increased availability of food selection and consumption.

Results from this study revealed that the type of oral contraceptive did not influence blood pressure. The greatest increase in blood pressure was displayed in the non-oral contraceptive group. This may have occurred due to insufficient sleep and increased consumption of alcohol. In the OC-NU group, 14 of 18 participants increased their alcohol intake at the end of 3 months. In addition, over the three month period, unlike the OC-U, 44% of the OC-NU increased their involvement in student organizations. Possibly, the amount of stress the

non-oral contraceptive group faced might have facilitated elevations in blood pressure. In addition, the OC-NU decreased the amount of hours they spent sleeping, which may have contributed to their blood pressure.

Since no research has looked at the effect of types of oral contraceptives on changes in social eating, comparisons are currently unavailable. Thus the uniqueness of this study were (1) use of two commonly prescribed oral contraceptives to freshman females and its influence on weight; (2) population was specific to freshman females; (3) this research looked at type of oral contraception and changes in social eating; (4) the duration of the study was longer than previous studies (3 months vs. limited number of days); (5) all participants were recruited from the Women's Health Center; and (6) assessment of height, weight, and blood pressure.

In conclusion, the research displayed no significant differences in weight gain and social eating patterns among the two different estrogen contents in the OC-U and OC-NU. In all groups, weight increased by approximately 3 pounds. An interesting observation that was noted the greatest increase in systolic blood pressure in the OC-NU group from 0-3 months. Recommendations for future research should include having larger sample size with varied ethnicities, extending the duration of the research (e.g. one year), assessment of anthropometric and social changes at 4 different time intervals (0, 4,8,12 months), and assessment of weight change among different types of oral contraceptive users during their 4 years of academic education.

5. REFERENCES

- [1] Flegal KM, Carroll MD, Ogden CL, Johnson CL. Prevalence and trends in obesity among US adults, 199-2000. JAMA 2002;288:1723-1727.

- [2] Mokdad AH, Serdula MK, Dietz WH, et al. The spread of the obesity epidemic in the United States, 1991-1998. *JAMA* 1999;282:1519-1522.
- [3] Douglas KA, Collins JL, Warren C, et al. Results from the 1995 National College Health Risk Behavior Survey. *J Am Coll Health* 1997;46:156.
- [4] Hovell MF, Mewborn CR, Randle Y, et al. Risk of excess weight gain in university women: a three-year community controlled analysis. *Addict Behav* 1985;10:15-28.
- [5] Racette SB, Desusinger SS, Strube MJ, et al. Weight Changes, Exercise, and Dietary Patterns During Freshman and Sophomore Years of College. *JACH* 2005;53(6):249-250.
- [6] Butler SM, Black DR, Blue CL, Gretebeck RJ. Change in Diet, Physical Activity, and Body Weight in Female College Freshman. *Am J Health Behav* 2004; 28(1):24-32.
- [7] Wysocki S. A survey of American women regarding the use of oral contraceptives and weight gain (abstract). *Int J Gynecol Obstet* 2000; 70 (Suppl 1):114.
- [8] Mosher W, Martinez G, Chandra A, Abma J, Willson S. Use of Contraception and Use of Family Planning Services in the United States: 1982-2002. *Advance Data from Vital and Health Statistics* 2004: Number 350.
- [9] Brunnhuber S, Kirchengast S. Use of the oral contraceptive pill by Austrian adolescents with emphasis on the age of onset, side effects, compliance, and lifestyle. *Coll. Antropol* 2002; 26(2):467-75.
- [10] Del Melo NR, Aldrighi JM, Faggion D Jr., et al. A prospective open label study to evaluate the effects of the oral contraceptive Harmonet (gestodene75/EE20) on body fat. *Contraception* 2004;70:65-71.
- [11] Lech M, Ostrowska L. Effects of low-dose OCs on weight in women with Central European nutritional habits and lifestyles. *Contraception* 2002;66:159-162.

- [12] Coney P, Washenik K, Langley R, DiGiovanna J, Harrison D. Weight change and adverse event incidence with a low-dose oral contraceptive: two randomized placebo-controlled trials. *Contraception* 2001; 63(6): 297-302.
- [13] Hajhosseini L, Holmes T, Mohamadi P, Goudarzi V, McProud L, Hollenbeck C. Changes in body weight, body composition and resting metabolic rate (RMR) in first-year university freshman students. *Am College of Nutr* 2006;25(2):123-127.
- [14] Hoffman D, Policastro P, Quick V, Lee S. Changes in body weight and fat mass of men and women in the first year of college: a study of the “freshman 15.” *Am Coll Health* 2006; 55 (1): 41-45.

Table 1 Mean (\pm SD) weight (lbs) and BMI of subjects at baseline and 3 months

Groups	Wt-Baseline	Wt-3 Months	BMI-Baseline	BMI- 3 Months
OC-1	139.0 \pm 22.7	141.8 \pm 23.2	23.9 \pm 4.0	24.3 \pm 3.9
OC-2	149.6 \pm 29.1	152.5 \pm 31.7	24.8 \pm 4.6	25.2 \pm 5.0
OC-NU	138.1 \pm 21.7	142.5 \pm 21.7	23.2 \pm 4.1	23.8 \pm 3.5
Total	142.9 \pm 25.4	146.1 \pm 21.7	24.0 \pm 4.1	24.5 \pm 4.3

OC-1 (Ortho Lo)

OC-2 (Desogen)

OC-NU (Non-Oral Contraceptive Users)

Figure 1

Systolic Blood Pressure of Study Groups (mmHg)

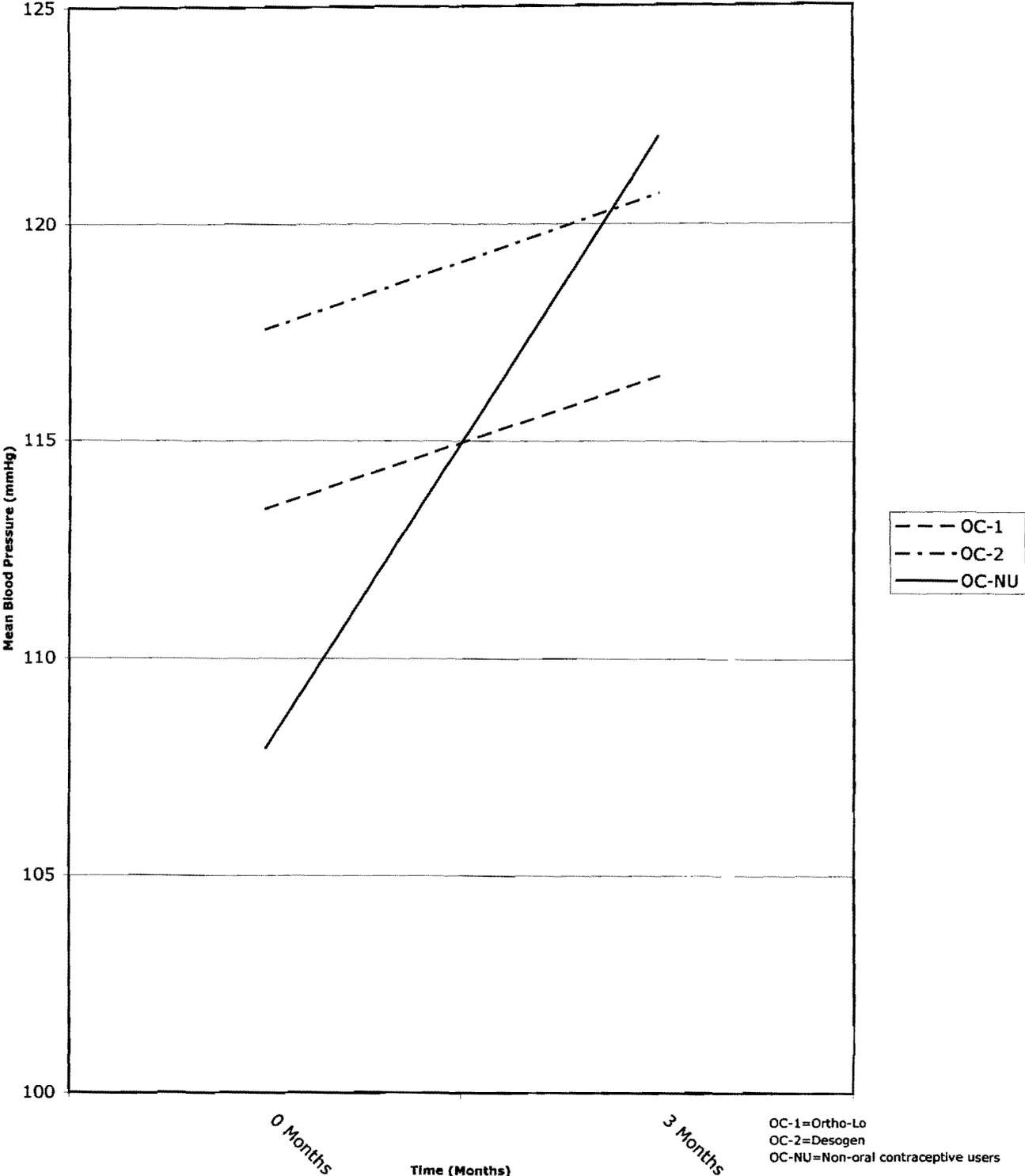


Figure 2

Diastolic Blood Pressure of Study Groups (mmHg)

