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Variations in body mass index of users of depot-medroxyprogesterone acetate as a contraceptive

Márcia Pantoja, Tatiane Medeiros, Maria Carolina Baccarin, Sirlei Siani Morais, Luis Bahamondes, Arlete Maria dos Santos Fernandes*

Human Reproduction Unit, Department of Obstetrics and Gynecology, School of Medical Sciences, University of Campinas (UNICAMP), and National Institute of Hormones and Women Health, Campinas, SP 13084-971, Brazil

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Abstract

Background: Weight gain is a frequent reason for discontinuing the contraceptive with depot-medroxyprogesterone acetate (DMPA).
Study Design: This 3-year retrospective cohort study assessed body mass index (BMI; kg/m^2) variations in 379 current or past DMPA users compared to TCu380A intrauterine device (IUD) users matched for age and BMI, categorized into G1 (normal weight), G2 (overweight) or G3 (obese) according to baseline BMI. Variations in weight and BMI were evaluated using analysis of variance.
Results: BMI increased progressively in all groups but significantly more in G1 and G2 DMPA users compared to nonusers and according to duration of use. In the G3 subgroup, weight trends were similar in the DMPA and IUD users.
Conclusions: Normal and overweight women increased BMI with DMPA use; however, obese women did not increase weight. Weight increase in DMPA users could be associated with metabolic alterations related to duration of use in normal and overweight women and to alterations already present in obese women. Prospective studies are required to determine triggering factors. DMPA use ≤3 years was not associated with weight increase in women with BMI (kg/m^2) ≥30.

Keywords: Depot-medroxyprogesterone acetate; contraception; Weight; Obesity

1. Introduction

Depot-medroxyprogesterone acetate (DMPA) is a contraceptive method used worldwide by millions of women [1]. The pregnancy rate associated with this method is 0.25–0.30 women a year at the end of the first year of use, very close to that of tubal ligation, contraceptive implants and the TCu380A intrauterine device (IUD) [2]. Unlike other hormonal methods, the efficacy of DMPA is unaffected by the weight of the user [3] and the method may be used by women for whom the use of estrogens is contraindicated [4,5].

One of the main reasons given by women for discontinuing the method is weight gain [4]. Many of the previous studies carried out to assess weight variations in DMPA users failed to control for baseline weight and results were controversial [1]. A study performed among American Navajo Indians suggested ethnic differences in metabolism as an explanation for the weight gain observed during DMPA use in this group of women [6]. On the other hand, a randomized, double-blind, placebo-controlled clinical trial in which energy intake, energy loss and weight variation were evaluated in DMPA users failed to show any difference between users and controls [7].

Results from retrospective studies with extended follow-up in which weight variations in DMPA users and nonhormonal contraceptive methods were compared have been conflicting. A study carried out in a group of women who used DMPA for up to 5 years, paired for age and weight to a group of copper IUD users, found that the weight of women in both groups had increased by the end of the observation period; however, in the case of the DMPA users, this increase in weight was greater than that of the controls [8]. Other investigators evaluated DMPA users compared to IUD users paired for age, weight and socioeconomic status

* Corresponding author. Tel.: +55 19 3289 2856; fax: +55 19 3289 2440.
E-mail address: arlete@fcm.unicamp.br (A.M. dos Santos Fernandes).

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over a 10-year period and detected no increase in weight in the DMPA group [9].

A study with a follow-up period of 30 months evaluated weight, fat mass and central body fat distribution in 178 DMPA users and 145 users of nonhormonal contraceptive methods 18–35 years of age and found that fat mass in DMPA users increased from a 25.3±12.6 kg (mean±S.D.) at baseline to 31.4±17.8 kg at 30 months, an increase of 6.1 kg compared to the negligible changes in fat mass found in the controls [10]. Weight gain was associated with the duration of use of the method, whereas the variations in fat mass and percentage of fat were associated with the duration of use of the method and inversely associated with regular physical activity.

Studies in DMPA users in which initial body mass index (BMI; kg/m^2) rather than weight is evaluated are scarce. Two studies carried out in adolescents showed that at 12 and 18 months of follow-up, overweight and obese DMPA users had gained more weight compared to the adolescents of normal weight [11,12]. Consequently, the World Health Organization (WHO) established a new subcondition within the eligibility criteria for DMPA use by obese adolescents <18 years of age, defining Category 2 for use of the method [13]. From a practical point of view, the question is whether DMPA use by obese women will affect their weight gain. Therefore, the objective of the present study was to evaluate the variation in BMI (kg/m^2) from baseline figures calculated prior to initiation of DMPA use in acceptors of this contraceptive method and to compare it with that of women using the TCu380A IUD over a 3-year period.

2. Materials and methods

This was a retrospective cohort study conducted at the Human Reproduction Unit, Department of Obstetrics and Gynecology, School of Medical Sciences, University of Campinas, Campinas, Brazil. The project was approved by the institutional review board of the university.

Calculation of sample size was based on the difference in weight between DMPA users and nonusers, applying analysis of variance (ANOVA) for repeat measures. Based on estimations of the mean increase in fat mass in users [10], sample size was calculated at 150 DMPA users. Significance level was defined as 5% and the power of the test as 80%. Data were obtained from the medical charts of 454 women who had opted to use DMPA (Depo-Provera®, Pfizer, São Paulo, Brazil) and who had used this method continuously for at least 3 years from January 1991 to December 2000. Data from the charts of 1074 women who had used the TCu380A IUD for a similar period of time were used to form a nonusers group. Women with diabetes mellitus, hyper- or hypothyroidism, chronic renal failure and rheumatic diseases requiring chronic use of corticoids and women who had undergone any type of organ transplant were excluded from the study. After pairing for age and baseline BMI (kg/m^2), the study sample included 379 DMPA users and nonusers. The baseline weight and height measurements considered in the analysis were those recorded at the time of initiation of use of the method. Measurements were then made annually to permit calculation of BMI (kg/m^2).

DMPA users and nonusers were allocated to one of 3 groups according to their baseline BMI. Group 1 (G1) consisted of 226 women with BMI<25 kg/m^2; Group 2 (G2), 109 women with BMI ranging from 25 to 29.9 kg/m^2 and Group 3 (G3), 44 women in whom BMI was ≥30 kg/m^2. Intergroup analysis of the control variables was performed using the χ^2 test, Fisher's Exact test, Student's *t* test and the Mann–Whitney *U* test [14]. Mean BMI measurements were compared using ANOVA for repeat measures [15]. All data are presented as mean±S.D.

3. Results

The mean age of the DMPA users was 30.8±6.8 (S.D.) years compared to 30.9±6.8 years in the nonuser group. The mean number of previous deliveries was 2.6±1.6 in the women in the study group and 3.0±2.0 in those of the nonuser group. There were no differences in mean baseline weight between the DMPA and IUD users: 58.7±11.7 and 59.4±11.2 kg, respectively. Likewise, there was no significant difference between the two groups with respect to height (154.8±6.3 and 154.5±5.8 cm) or baseline BMI (24.5±4.7 and 24.8±4.4 kg/m^2), respectively (data not shown). However, when the women were classified into groups according to their baseline BMI, there were significant differences between the groups with respect to mean age: 29.3±6.5 years for women in G1, 33.0±6.8 years for women in G2 and 33.5±6.0 years for women in G3, respectively (Table 1).

There was a significant difference in baseline weight between users and nonusers in G1, mean weight of DMPA users being lower than that of controls: 51.6±6.5 compared to 53.0±6.2 kg, respectively. However, no differences were found in the other two groups. There was no significant difference in mean height or in the number of previous deliveries between the groups. At the end of the third year of use, the mean increase in weight recorded in the DMPA users in G1 was 4.5±4.5 kg, while in the nonusers in G1 this increase was 1.2±4.0 kg. In G2, the mean increase in weight at 3 years was 3.4±5.5 and 0.2±4.9 kg for DMPA users and nonusers, respectively, while in G3, this increase was 1.9±6.7 and 0.6±7.0 kg, respectively (Table 2).

With respect to the variation in BMI, a progressive increase occurred throughout follow-up both in users and nonusers in all three groups; however, in G1 and G2, this increase was significantly greater in DMPA users compared to nonusers ($p<.0107$ and $p<.0001$, respectively). Or in other words, women of G3 presented a less increase in BMI than G1 and G2. When the increase in BMI was correlated with duration of use of the contraceptive method, the increase was