BODY COMPOSITION METHODS ACROSS THE MENSTRUAL CYCLE

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INTRODUCTION

The menstrual cycle (MC) elicits many physiological adaptations that may influence health and nutrition related recommendations for women. Hormonal fluctuations and hormonal contraception's potential impact on specific factors related to body composition are inconclusive. Evaluating the sensitivity of technologies that measure body composition is an important consideration when informing female specific health recommendations as measurements are often taken at various points across the MC.

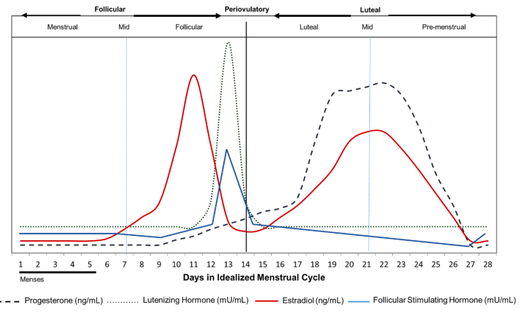


FIGURE 1. Eumenorrheic Menstrual Cycle

OBJECTIVE

The purpose of this study was to examine the impact of the menstrual cycle (MC) and hormonal contraception on body composition measurements of lean mass (LM) and fat mass (FM).

PARTICIPANTS

60 women were enrolled and included in the analysis.

Group	Age (yrs)	Height (cm)	Weight (kg)	BMI (kg/m²)
EUM (n=19)	27.9 ± 7.3	165.7 ± 7.5	65.0 ± 8.6	23.5 ± 2.4
OC (n=21)	22.3 ± 5.7	166.1 ± 6.7	65.0 ± 10.4	23.5 ± 3.2
H-IUD (n=20)	27.0 ± 7.3	166.1 ± 5.2	65.2 ± 9.3	23.7 ± 9.3

TABLE 1. Participant Demographics (Mean ± Standard Deviation)

EUM: regular naturally occurring MC/ non-hormonal IUD

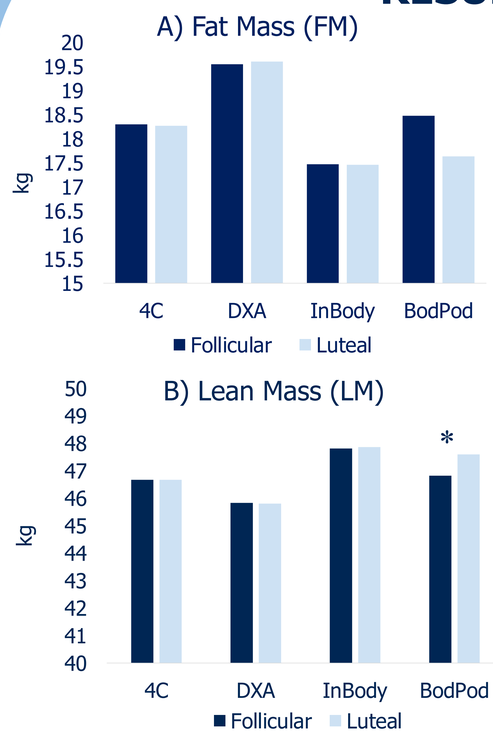
OC: monophasic oral contraceptive

H-IUD: hormonal intrauterine device

PRACTICAL APPLICATION

Despite physiological changes, the accuracy of body composition measurement techniques did not appear to be impacted by the menstrual cycle or hormonal contraception. Fat mass and lean mass do not appear to be significantly different in low vs high hormone phases.

RESULTS



FIGURES 2A & B) Influence of menstrual cycle phase (follicular vs luteal) on body composition measurements FM and LM. No significance was found between groups across the menstrual cycle phases from paired samples t-tests; except for BodPod in LM between phases. (* denotes p<.05)

Δ = follicular-luteal

GROUP	Δ FM (kg)	Δ LM (kg)
4C OC	-0.56	0.66
DXA OC	-0.16	0.24
InBody OC	0.01	-0.05
BodPod OC	0.34	-0.29
4C H-IUD	0.20	-0.21
DXA H-IUD	0.14	-0.27
InBody H-IUD	0.06	-0.06
BodPod H-IUD	1.52	-0.02
4C EUM	0.50	-0.50
DXA EUM	-0.15	0.06
InBody EUM	0.05	-0.07
BodPod EUM	0.69	-2.11*

TABLE 2. FM and LM differences in measurement (Δ = follicular-luteal phase). No significance was found between groups (OC, H-IUD, EUM) from paired samples t-tests; except for BodPod in LM between phases. (* denotes p<.05)

METHODS

Body composition was measured in the follicular and luteal phases of the menstrual cycle in healthy, active females. Measurements were taken after an overnight fast. Body composition was measured using dual-energy x-ray absorptiometry (DXA), BodPod, multi-frequency bioelectrical impedance spectroscopy (BIS), and the gold standard four-compartment criterion (4C) method.

GE Lunar iDXA, GE Medical Systems

InBody 770, BioSpace

Cosmed, USA Software

Four compartment criterion (4C) equation*

FM (kg) = 2.748(BV) – 0.699 (TBW) + 1.129 (Mo) – 2.051 (BM)
%BF = (FM/BM) x 100
FFM (kg) = BM – FM ***Gold Standard**

CONCLUSION

The use of BodPod may not be appropriate for measuring fat mass and lean mass in females (p>0.77±3.1). The menstrual cycle appears to have little effect on the accuracy of body composition measurements otherwise, despite known physiological changes that occur. Depending on frequency, accessibility, feasibility, the 4C method, DXA, and InBody may be best for tracking changes in FM and LM in females.

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