STRENGTH TRAINING AND THE MENSTRUAL CYCLE: EFFECTS OF FOLLICULAR- AND LUTEAL PHASE-BASED TRAINING ON MUSCULAR STRENGTH AND MUSCLE DIAMETER IN SUBJECTS WITH ORAL CONTRACEPTION

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Purpose: Modern monophasic oral contraceptives (OC) contain fixed doses of estrogen (E) and progestogen (P) which are taken for 21 consecutive days, followed by 7 days without any hormone intake. There wouldn't be any differences in blood concentrations of estradiol (E2) and progesterone (Prg) during the first 21 days of the menstrual cycle. The regulation of other interacting hormones like hGH, IGF-1, testosterone, and DHEAs, all of them possible anabolic hormones on the level of the muscular cell and important regulating factors during strength training, is not clear so far in OC users. Therefore, we investigated possible different effects of “quasi follicular phase-based” versus “quasi luteal phase-based” strength training (qFT and qLT) on strength parameters and muscle volume in oral contraceptive users.

Methods: 16 healthy untrained or moderately trained women (age: 22.5 ± 2.3 yrs, height: 167.2 ± 6.4 cm, weight: 64.0 ± 9.1 kg) using OC completed a strength training program of the m. quadriceps femoris for each leg on the Leg Press for 3 menstrual cycles (approx. 12 weeks). The subjects were divided into group A and group B. Group A performed qFT with the right leg and qLT with the left leg and vice versa for Group B. qFT was organized 4 times a week in qFO and once in qLU, and qLT was organized 4 times a week in qLU and once a week in qFO. Blood samples were taken on 11th day in qFO and on 25th day in qLU of the menstrual cycle to analyze values of E2, progesterone (Prg), FSH, LH, total testosterone (tT), free testosterone (fT), IGF-1, DHEA-S and hGH. Maximum isometric force (Fmax-iso) was measured for each right and left leg prior to, during (2 times per cycle), and after training. Muscle diameters (Mdm) were measured by means of ultrasound for M. quadriceps prior to and after training, and sum of Mdm of M. rectus femoris, M. vastus intermedius and M. vastus lateralis was calculated.

Results:
E2, LH, FSH, tT and DHEAs were significant higher in qFO as compared to qLU, and Prg, hGH, IGF-1 and fT were not significantly different between the two phases. Fmax-iso increased significantly by 24.9 ± 13.6 kg (+29.0 %) after qFT and by 25.6 ± 11.9 kg (+31.9 %) after qLT without any difference between the effects of qFT and qLT. Mean value of Mdm increased significantly by 0.41 ± 0.43 cm (+6.8 %) after qFT and by 0.49 ± 0.41 cm (+8.5 %) after qLT without any significant difference between both interventions.

Conclusions: Both, qFT and qLT showed significant effects on muscle strength and muscle diameter after 3 months of intervention without any differences between both interventions. This is in contrast to findings in women without use of oral contraception, who clearly showed a higher increase of muscle strength and muscle diameter after FT as compared to LT. The underlying mechanisms for these different effects have to be analyzed in further studies.

Keywords:
Menstrual cycle, Oral contraceptive, Strength training

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