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*The assessment of the selected ovarian hormones in infertile women*

Infertility is defined as the absence of conception after one year of regular sexual intercourse, without any contraception. Primary infertility affects women who have never been pregnant, secondary infertility, women who have been pregnant before (4). One of the basic tests evaluating the fertility is the serum hormones level assessment (1, 6, 7). The estrogens and progesterone serum concentration may be the basis for ovulation confirmation in a transitive way (2, 5). The fundamental test which should be performed in case of fertility troubles is the oestradiol serum concentration assessment (E2), which is dependent on the menstrual phase. Its serum concentration ranges between 50 pg/ml in follicular phase, to 400 pg/ml in ovulatory phase (5). Progesterone is the hormone which allows, in an indirect way, to determine the ovulation performing. For this purpose, its serum level concentration evaluation in the middle of luteal phase, should be done (3, 5, 10). The normal serum level of progesterone, in the premenstrual phase, is between 0.8 and 1.2 mg/l. The serum progesterone level over 10–18 mg/l between 20 and 24 day of the normal period suggests the ovulation. The low serum level of the progesterone is ascertained in the lack of ovulation. Similarly low and high prolactine serum levels have influence on the progesterone production (2, 3, 9).

The aim of the study was the recognition and determination of infertility reasons, the definition and assessment of the hormones having impact on the fertility such as: oestradiol and progesterone, serum level concentration.

MATERIAL AND METHOD

The study was performed at Gynecologic Endocrine Department of Medical Academy in Warsaw. The clinical material was constituted of 266 patients suffering infertility, treated at the department, between 1999 and 2003, living in Mazovian district. Primary infertility was ascertained in 170, secondary in 96 women. The age ranged between 21 and 46 (medium 29.6) years. The medium age of the first menstruation was 13.5 years. The personal inquiry form, which was the basis for the clinical data, was prepared. The data were obtained based on the medical records and interviews. The hormones serum concentration evaluation was performed with ELFA (enzyme-immunofluorescent) method. All tests were performed at the hospital laboratory, which has its own norms for each phase of menstrual period, and for each test are as follows: oestradiol in follicular phase – 20–155 pg/ml, progesterone in luteal phase – 1,5–20 ng/ml. The obtained results were calculated and put to the statistical analysis, using the t-Student test. The statistically significant value was:  $p < 0.05$ .

## RESULTS

The progesterone serum concentration in the whole group ranged between 0.20 and 37.41 ng/ml, (medium 6.55), slightly higher level – 0.23 to 37.41 (medium 7.06) was ascertained in women suffering secondary infertility, compared to women suffering primary infertility, where the progesterone level was 0.20 to 25.81 ng/ml (medium 6.25) (table 1). The dividing of the examined group, according to the progesterone level, demonstrated the value beneath the norm in 29.4% of patients, in 66.9% of patients was normal: 1.5–20 ng/ml, and in 3.7 % exceeded the normal level and was over 20 ng/ml (table 2).

Table 1. The value of the progesterone and oestradiol concentration

Primary infertility		Secondary infertility		Total		Differences between groups
$\bar{x} \pm SD$	Me	$\bar{x} \pm SD$	Me	$\bar{x} \pm SD$	Me	
The progesterone serum concentration in pg/ml during the 22–24 day of period						
n = 155		n = 90		n = 245		
6.25 ± 6.14	4.33	7.06 ± 6.67	5.62	6.55 ± 6.34	4.90	nz
The oestradiol serum concentration in pg/ml during the 6–8 day of period						
n = 170		n = 96		n = 266		
77.58±65.98	59.55	83.08±56.32	64.85	79.57±62.62	62.05	nz

$\bar{x}$  – The arithmetical means, SD – standard deviation, n – number of tested patients, nz – not statistically significant difference

The oestradiol serum concentration in the investigated group in 266 cases ranged between 9.0 and 500.52 pg/ml (medium 79.57). A slightly higher level, ranged between 16.36 and 350.07 pg/ml (medium 83.08) was ascertained in women suffering secondary infertility, compared to the patients suffering primary infertility, in which it ranged between 0.10 and 3.86 pg/ml (medium 77.58) (table 1).

Table 2. The structure of the studied group in dependence on progesterone concentration

Progesterone level ng/ml	P < 1.5	1.5 < P < 10	10 < P < 20	20 < P	Total
Number of patients	75	114	50	9	245
The percent disposition (%)	29.4	46.5	20.4	3.7	100

## DISCUSSION

In each woman suffering infertility the progesterone serum level was normal, according to the laboratory range, but was close to its low border. A statistically insignificant higher progesterone level was confirmed in women suffering primary infertility. The progesterone serum concentration test demonstrated its value under the normal range in 29.4% of patients. The shortage of ovulation and corpus luteum inefficiency may be the reason. In 66.9% of patients, the progesterone level was normal, in 3.7% it was elevated.

In a study by Szczurowicz et al. (8), the median value of progesterone serum level in women, suffering mechanic infertility during 25<sup>th</sup> day of the period was 3.57 ng/ml. In the group of patients suffering secondary infertility the oestradiol serum level was insignificantly statistically higher, compared to the women suffering primary infertility.

In a study by Szczurowicz et al. (8), during the 8<sup>th</sup> day of the period, the medium oestradiol serum level was 57.3 pg/ml.

## CONCLUSIONS

The reason for the women's infertility is the lowered progesterone concentration.

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## SUMMARY

The aim of the study was the recognition and determination of infertility reasons, the definition and assessment of the serum level hormones having impact on the fertility such as: oestradiol and progesterone, concentration. The study was performed at Gynecologic Endocrine Department of Medical Academy in Warsaw. The clinical material was constituted of 266 patients suffering infertility, treated at the department between 1999 and 2003, living in Mazovian district. Primary infertility was ascertained in 170, secondary in 96 women. The age ranged between 21 and 46 (medium 29.6) years. The medium age of the first menstruation was 13.5 years. The personal inquiry form, which was the basis for the clinical data, was prepared. The data were obtained based on the medical records and interviews. The hormones serum concentration evaluation was performed with ELFA (enzyme-immunofluorescent) method. All tests were performed at the hospital laboratory, which has its own norms for each phase of menstrual period, and for each test are as follows: oestradiol in follicular phase – 20–155 pg/ml, progesterone in luteal phase – 1.5–20 ng/ml. The obtained results were calculated and put into the statistical analysis, using the t-Student test. The medium progesterone serum concentration in the

whole group was  $6.55 \pm 6.34$  ng/ml. A statistically insignificant concentration was ascertained in women suffering secondary infertility. The medium estradiol serum level during the follicular phase was  $79.57 \pm 62.62$  pg/ml. In the group of women suffering secondary infertility, the estradiol level was insignificantly statistically higher. The reason for the women's infertility is the lowered progesterone concentration.

#### Ocena poziomu wybranych hormonów jajnikowych u kobiet z niepłodnością

Celem pracy było rozpoznanie i ustalenie przyczyn niepłodności u kobiet, określenie i ocena poziomu hormonów, takich jak estradiol i progesteron. Badania przeprowadzono w Klinice Endokrynologii Ginekologicznej Akademii Medycznej w Warszawie. Materiał kliniczny stanowiła grupa 266 pacjentek, leczonych w Klinice w latach 1999–2003 z powodu niepłodności, zamieszkałych na terenie województwa mazowieckiego. Niepłodność pierwotną stwierdzono u 170, zaś niepłodność wtórną u 96 pacjentek. Wiek badanych wahał się między 21 a 46 (średnio 29,6) lat. Średni wiek wystąpienia pierwszej miesiączki wynosił 13,5 lat. Dla potrzeb badania opracowano kwestionariusz ankiety, za pomocą którego zebrano dane w oparciu o informacje uzyskane z analizy dokumentacji i rozmówz pacjentkami. Oznaczeń poziomu hormonów dokonano za pomocą metody immunoenzymatycznej z zastosowaniem techniki ELFA (enzymimmuno fluorescencyjnej). Wszystkie badania zostały wykonane w laboratorium szpitalnym, które ma ustalone własne normy dla kobiet w poszczególnych fazach cyklu miesiączkowego i dla poszczególnych badań przedstawiają się następująco: estradiol w fazie folikularnej cyklu miesiączkowego 20–155 pg/ml, progesteron w fazie lutealnej 1,5–20 ng/ml. Uzyskane wyniki poddano obliczeniom i analizie statystycznej przy użyciu testu t - Studenta. Stężenie progesteronu w badanej grupie w fazie lutealnej wynosiło średnio  $6,55 \pm 6,34$  ng/ml. Niezamiennie statystycznie wyższy poziom stwierdzono w grupie kobiet z niepłodnością wtórną. Stężenie estradiolu w surowicy krwi w fazie folikularnej wynosiło średnio  $79,57 \pm 62,62$  pg/ml. W grupie kobiet z niepłodnością wtórną średni poziom estradiolu był niezamiennie statystycznie wyższy. Przyczyną niepłodności u kobiet było obniżone stężenie progesteronu.