

Cost-effectiveness analysis of In Vitro Fertilization (IVF) antagonist protocols utilizing highly purified human menopausal gonadotropin (HP-hMG) and three different recombinant FSH (rFSH) preparations

STUDY QUESTION

Is there a mixed ovarian stimulation antagonist protocol for IVF that obtains more good quality blastocysts with less cost?

SUMMARY ANSWER

Mixed protocol of HP-hMG and follitropin delta obtains a significantly more good quality blastocysts with significantly lower cost per embryo obtained.

WHAT IS KNOWN ALREADY

FSH and LH are used for controlled ovarian stimulation (COS) to increase the number of oocytes produced in IVF. Determination of a stimulation protocol and FSH dosage is generally established by the physician based on the patient's age, body weight and ovarian reserve profile. Mixed protocols (concomitant HP-hMG and rFSH) for ovarian stimulation have been used to obtain better quality oocytes and embryos and thus, higher pregnancy rates compared to the use of rFSH alone. However, to date no data exist comparing cost-effectiveness of mixed protocols using different rFSH preparations

STUDY DESIGN, SIZE, DURATION

Design:

This is a cost-effectiveness analysis of the retrospective cohort study conducted at Clinique Ovo and Olive Fertility Centre from January 2018 to September 2019.

Procedures:

Enrollment of patients undergoing controlled ovarian stimulation for in vitro fertilization (IVF) using a mixed antagonist protocol.

Size:

Women aged 18-42 years.

Participants were divided into 3 groups of 89 subjects each according to the rFSH used (total of subjects 267):

- Group A = HP-hMG; Menopur® + follitropin alfa (Gonal-F®)
- Group B = HP-hMG; Menopur® + follitropin beta (Puregon®)
- Group D = HP-hMG; Menopur® + follitropin delta (Rekovele®)

PARTICIPANTS, SETTING, METHODS

HP-hMG was used in all three groups while different rFSH was prescribed. All three groups used an antagonist protocol. IVF or intra-cytoplasmic sperm injection (ICSI) was used as clinically indicated. Resulting embryos were cultured until day 5 or 6. The dose of gonadotropins used, the number of mature oocytes (MII), the number of utilizable blastocysts and the FSH/blastocyst ratio were evaluated. For cost-effectiveness analysis we used prices accepted by the provincial healthcare system in Quebec.



MAIN RESULTS

The mean age of subjects was 34.62 years (\pm 3.74) and weight 71.65 kg (\pm 14.61). No significant differences were observed in age or weight among groups. Since follitropin delta is administered in micrograms, the comparison between rFSH preparations was performed using dose equivalence between (10 μ g follitropin delta) and (150 IU follitropin alpha and beta).

Statistically significant differences were observed among groups in mean total dose of FSH (IU) and number of days of stimulation. Group D used less gonadotropins despite a longer stimulation.

No statistically significant differences were observed in the number of MII oocytes. However, the number of good quality utilizable blastocysts was significantly higher in group D than in group A or B. The FSH/blastocyst ratio was significantly lower in group D than in the other groups.

The total price per cycle was similar between groups, however the price per embryo obtained was significantly lower in group D (\$779) than in the other groups (A= \$1,033, B= \$1,014).

LIMITATIONS, REASONS FOR CAUTION

The limitation of this cost-effectiveness analysis is the retrospective nature of the study.

WIDER IMPLICATIONS OF THE FINDINGS

Our analysis demonstrates that the price per cycle was similar between the groups, however the price per embryo obtained was significantly lower in group D compared to the other groups. This gives follitropin delta an advantage in terms of cost-effectiveness.

	GROUP A	GROUP B	GROUP D	P-value
OVARIAN STIMULATION				
Total dose HP-hMG (IU)	2109 +/- 811	1567 +/- 687	1918 +/- 928	A-B p < 0.01 A-D p = 0.26 B-D p = 0.01
Total dose rFSH (IU)	2160 +/- 909	2380 +/- 620	1794 +/- 522	A-B p = 0.09 A-D p < 0.01 B-D p < 0.01
Total dose FSH (IU)	4269 +/- 1217	3947 +/- 1110	3713 +/- 1353	A-B p = 0.19 A-D p < 0.01 B-D p = 0.41
Duration of stimulation (days)	11.6 +/- 1.5	10.6 +/- 1.37	11.4 +/- 1.3	A-B p < 0.01 A-D p = 0.41 B-D p < 0.01
LABORATORY OUTCOMES				
MII oocytes	11.5 +/- 7.1	10.28 +/- 5.1	10.9 +/- 7.4	0.46
Good quality blastocyst	3.9 +/- 3.1	3.6 +/- 2.5	4.8 +/- 3.5	A-B p = 0.73 A-D p = 0.15 B-D p = 0.02
FSH/Blastocyst ratio	541.69	653.78	370.56	A-B p = 0.63 A-D p = 0.11 B-D p = 0.02

Single-way ANOVA with post-hoc Tukey multiple comparison test

	GROUP A	GROUP B	GROUP D
Total price /cycle	4028 \$	3649 \$	3740 \$
Price/embryo	1033 \$	1014 \$	779 \$

COST-EFFECTIVENESS