Serum Albumin Levels in Women With Ovarian Hyperstimulation Syndrome With or Without Polycystic Ovaries

Abdulrahman Alserri, MD, Hananel Holzer, MD, Togas Tulandi, MD, MHCM

Department of Obstetrics and Gynecology, McGill University, Montreal QC

Abstract

Objective: To evaluate serum albumin levels in women with and without polycystic ovaries (PCO) before and during the development of ovarian hyperstimulation syndrome (OHSS), and to compare them with control women who did not develop OHSS.

Methods: We conducted a case–control study in a teaching hospital in which 49 women who developed OHSS after ovarian follicular stimulation for infertility were evaluated and compared with 91 control women who did not develop OHSS. The main outcome measures were levels of serum albumin, measured once in control subjects and before and after the development of OHSS in cases.

Results: Among women who developed OHSS, 30 had PCO and 19 others had no PCO. The mean baseline serum albumin level in women with PCO who subsequently had severe OHSS (38.8 ± 1.0 g/L) was lower than in those who developed moderate OHSS (41.8 ± 0.8 g/L) ($P < 0.05$) and in the control group (41.7 ± 0.4 g/L) ($P < 0.03$).

Conclusion: Baseline serum albumin levels in women with PCO who subsequently develop severe OHSS are lower than in those who develop moderate OHSS or do not develop OHSS. Confirmation of these findings with a large study is needed.

Résumé

Objectif : Évaluer les taux sériques d'albumine chez des femmes qui présentent ou non des ovaires polykystiques (OPK), avant et pendant l'apparition d'un syndrome d'hyperstimulation ovarienne (SHO), et les comparer à ceux de témoins n'ayant pas vu apparaître un SHO.

Méthodes : Nous avons mené, au sein d'un hôpital universitaire, une étude cas-témoins dans le cadre de laquelle 49 femmes ayant vu apparaître un SHO (à la suite d'un traitement de stimulation folliculaire ovarienne visant à contrer l'infertilité) ont été évaluées et comparées à 91 témoins n'ayant pas vu apparaître un SHO. Les principaux critères d'évaluation étaient les taux sériques d'albumine, lesquels ont été mesurés à une reprise chez les témoins et à deux reprises (avant et après l'apparition d'un SHO) chez les autres participantes.

Résultats : Chez les femmes qui ont vu apparaître un SHO, 30 présentaient des OPK, contrairement aux 19 autres. Le taux sérique de base moyen d'albumine était plus faible chez les femmes présentant des OPK qui ont par la suite connu un SHO grave (38,8 ± 1,0 g/l) que chez les femmes ayant connu un SHO modéré (41,8 ± 0,8 g/l) ($P < 0,05$) et les femmes du groupe témoin (41,7 ± 0,4 g/l) ($P < 0,03$).

Conclusion : Les taux sériques de base d'albumine sont plus faibles chez les femmes présentant des OPK qui connaissent par la suite un SHO grave que chez celles qui connaissent un SHO modéré ou chez lesquelles ce syndrome n'apparaît pas. La confirmation de ces résultats au moyen d'une étude de grande envergure s'avère requise.

Key Words: Albumin, OHSS, ovarian hyperstimulation syndrome, polycystic ovaries, PCO, polycystic ovary syndrome

Competing Interests: See Acknowledgements.

Received on April 2, 2012

Accepted on June 5, 2012

J Obstet Gynaecol Can 2012;34(9):866–869

INTRODUCTION

Ovarian hyperstimulation syndrome consists of ovarian enlargement due to multiple ovarian cysts and an acute fluid shift out of the intravascular space secondary to increased capillary permeability that is mediated mainly by vascular endothelial growth factor. It is a serious complication of follicular stimulation with ovulation-inducing agents. OHSS occurs after luteinization of a large number of follicles. Accordingly, women with polycystic ovaries are prone to developing OHSS.[1–3] In women with OHSS, the serum albumin level is markedly reduced.[4]

Duleba and Ahmed reported increased albumin excretion in some women with polycystic ovary syndrome.[5] Whether this could be related to the increased occurrence and severity of OHSS in women with PCO is unknown.

The purpose of our study was to evaluate serum albumin levels in women with and without PCO before and during the development of OHSS, and to compare them with control women who did not develop OHSS.

MATERIALS AND METHODS

We conducted a case–control study in which cases were women who were seen and treated for OHSS at McGill University Health Centre, Montreal, between January 1998 and April 2011. We included all women with OHSS who had had a baseline serum albumin level before treatment with ovulation inducing agents and at the time of diagnosis of OHSS. The serum albumin level was measured as part of a general medical assessment. We then compared these levels to those of 91 control women who underwent the same treatment at the same time but did not develop OHSS. The degree of OHSS was classified using the classification of Lunenfeld et al.[6] Grade I (mild) OHSS consists of bilateral ovarian enlargement with multiple follicular and corpus luteum cysts up to 5 cm in mean diameter, with serum estradiol concentration over 1500 pg/mL (6000 pmol/L) and serum progesterone concentration over 30 ng/mL (115 nmol/L) in the early part of the luteal phase. Grade II (moderate) OHSS consists of ovarian enlargement of up to 12 cm, accompanied by abdominal discomfort and gastrointestinal symptoms (nausea, vomiting, and diarrhea). Grade III (severe) OHSS consists of ovarian enlargement over 12 cm, ascites, and, in some patients, pleural and/or pericardial effusion, electrolyte imbalance (hyponatremia, hyperkalemia), hypovolemia, and hypovolemic shock.

We divided the case and control groups into those with PCO (antral follicle count ≥ 24) and those without PCO (AFC < 24). Besides a high number of antral follicles, ultrasound images of women with PCO had the characteristic appearance of polycystic ovaries according to the Rotterdam criteria of 12 or more follicles in each ovary measuring 2 to 9 mm.[7] We then grouped cases into women with PCO who subsequently developed moderate OHSS (group A) or severe OHSS (group B), and women without PCO who subsequently developed moderate OHSS (group C) or severe OHSS (group D).

ABBREVIATIONS

AFC	antral follicle count
OHSS	ovarian hyperstimulation syndrome
PCO	polycystic ovaries

We used the Shapiro Wilks test to evaluate the distribution of the data. Comparisons were analyzed using Student *t* test or Mann-Whitney *U* test when appropriate. Proportions were compared with chi-square test or Fisher exact test. A *P*-value of < 0.05 was considered significant. For statistical analysis we used StatsDirect version 2.7.8b (StatsDirect Ltd, Cheshire, United Kingdom). The study was approved by the Research and Ethics Board, McGill University Health Centre.

RESULTS

Of a total of 49 women with OHSS, 30 had PCO and 19 did not. The proportions of women with and without PCO who developed severe OHSS were similar (40% and 31.6%, respectively). As expected, the mean antral follicle count in the PCO group (38.5 ± 3.1) was significantly higher than in the non-PCO group (14.6 ± 1.0) ($P < 0.001$). Maximum levels of serum estradiol, urea, creatinine, sodium, potassium, and hematocrit during OHSS in women with and without PCO are shown in Table 1.

The control group comprised 47 women with PCO and 44 without PCO. The mean AFC in the PCO control subjects (37.6 ± 1.6) was significantly higher than in the non-PCO control subjects (14.4 ± 0.4) ($P < 0.001$). The ovarian volumes at the time of diagnosis of OHSS in women with PCO who had severe and moderate OHSS were 330.3 mL and 185.5 mL, respectively, and in those without PCO ovarian volumes were 176.4 mL and 196.8 mL, respectively.

Serum albumin levels in women with OHSS are shown in Table 2. The mean baseline serum albumin level in women with PCO who subsequently had severe OHSS (group B; 38.8 ± 1.0 g/L) was lower than in those in who developed moderate OHSS (group A; 41.8 ± 0.8 g/L) ($P < 0.05$). The mean serum albumin level on the day of diagnosis of OHSS in group B (25.2 ± 1.6 g/L) was also lower than that in group A (34.1 ± 6.1 g/L) ($P < 0.001$). There was no significant difference in the mean baseline serum albumin level between women without PCO who subsequently developed moderate OHSS (group C) and those who developed severe OHSS (group D). The mean serum albumin level on the day of admission in women in group D was significantly lower than in women in group C (Table 2).

Women in group B had a lower mean baseline serum albumin level (38.8 ± 1.0 g/L) than women in the PCO control group (41.7 ± 0.4 g/L)($P < 0.03$). No significant difference was found in mean baseline serum albumin levels between women in group D (42.5 ± 1.0 g/L) and control subjects without PCO (41.8 ± 0.3 g/L).