



7-31-2024

Section: Obstetrics and Gynecology

Incidence, prevention and treatment of Ovarian Hypeyrstimulation Syndrome

Mohamed Atef

Obstetrics and Gynecology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

Amira Badereldin Mehaney

Embryology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

Doaa Mohamed Ahmed Mohamed Hassan

Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, Cairo, Egypt,

dodo_hummingbird@hotmail.com

Follow this and additional works at: <https://aimj.researchcommons.org/journal>



Part of the [Medical Sciences Commons](#), [Obstetrics and Gynecology Commons](#), and the [Surgery Commons](#)

How to Cite This Article

Atef, Mohamed; Mehaney, Amira Badereldin; and Hassan, Doaa Mohamed Ahmed Mohamed (2024) "Incidence, prevention and treatment of Ovarian Hypeyrstimulation Syndrome," *Al-Azhar International Medical Journal*. Vol. 5: Iss. 7, Article 58.

DOI: <https://doi.org/10.58675/2682-339X.2576>

This Original Article is brought to you for free and open access by Al-Azhar International Medical Journal. It has been accepted for inclusion in Al-Azhar International Medical Journal by an authorized editor of Al-Azhar International Medical Journal. For more information, please contact dryasserhelmy@gmail.com.

Incidence, prevention and treatment of Ovarian Hyperstimulation Syndrome

Mohamed Atef ^a, Amira B. Mehaney ^b, Doaa M. A. M. Hassan ^{c,*}

^a Department of Obstetrics and Gynecology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

^b Department of Embryology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

^c Department of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, Cairo, Egypt

Abstract

Background: A systemic condition known as ovarian hyperstimulation syndrome (OHSS) develops when the ovaries release vasoactive products due to their overstimulation.

Aim and Objectives: To detect the incidence, methods of prevention, & treatment of ovarian hyperstimulation syndrome at the ART unit of the International Islamic Institute of Population Studies and Research (IIIPSR) in the last three years, from 2018 until 2020.

Patients and Methods: This study included 8660 patients with a high risk of ovarian hyperstimulation syndrome and was done in the ART unit of the International Islamic Institute of Population Studies & Research in the last three years, from 2018 until 2020.

Results: The prevalence of OHSS in the ART unit of IIIPSR Al-Azhar University from 2018 to 2020 was 17.7%. The mild form represents 11.92% of total cases and 68% of OHSS cases; the moderate form represents 3.56% of total cases. 20% of OHSS cases, severe form represents 2% of total cases and 11.3% of OHSS cases, and patients admitted to IUC present 0.22% of total cases and 0.012% of OHSS cases.

Conclusion: A key predictor for the frequency of moderate to severe OHSS, quickly rising E2 levels (E2 5,000 ng/L), and/or at least 18 follicles on trigger day is an antral follicular count (AFC) of twenty-four or higher.

Keywords: Ovarian hyperstimulation syndrome (OHSS); Polycystic ovary syndrome (PCO); Antral follicular (AFC)

1. Introduction

O HSS is an excessive response to in vitro fertilization (IVF) treatment, a potentially life-threatening illness distinguished by a wide range of indications as well as symptoms, including abdominal distention & discomfort, ascites, enlarged ovaries, & other problems resulting from increased vascular permeability.¹

OHSS is a condition that occurs when hyperstimulated ovaries release vasoactive substances, leading to a systemic illness. Increased capillary permeability is a hallmark of the pathophysiology of OHSS, which causes fluid to escape from the vascular compartment. This leads to the accumulation of fluid in the third space and dehydration within the blood vessels. Severe symptoms include a propensity to develop blood clotting, impaired kidney and liver function, as well as acute respiratory distress syndrome (ARDS), resulting in significant illness. While the exact frequency of deaths caused by OHSS is uncertain and

potentially not fully documented, fatalities resulting from OHSS are infrequent. The documented causes of mortality comprise acute respiratory distress syndrome, cerebral infarction, and hepatorenal failure.²

The first step in developing primary preventive care for OHSS is to analyze the reliability of measures used to predict ovarian response. Ovarian response prediction primarily relies on ovarian reserve assessments, for instance, anti-Mullerian hormone (AMH), an individual's weight, antral follicular count, age, & specific patient characteristics, particularly those with polycystic ovary syndrome (PCOS), as well as the selection of an appropriate treatment protocol.³

Polycystic ovary syndrome is a prevalent hormonal disorder that is marked by infrequent or absent ovulation, excessive levels of male hormones in the body (hyperandrogenemia), and the presence of many cysts on the ovaries, as detected by ultrasonography. This condition impacts approximately 6–13% of females who are in their reproductive years.⁴

Accepted 21 July 2024.

Available online 31 July 2024

* Corresponding author at: Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, Cairo, Egypt.
E-mail address: dodo_hummingbird@hotmail.com (D. M. A. M. Hassan).

<https://doi.org/10.58675/2682-339X.2576>

2682-339X/© 2024 The author. Published by Al-Azhar University, Faculty of Medicine. This is an open access article under the CC BY-SA 4.0 license (<https://creativecommons.org/licenses/by-sa/4.0/>).

Women with polycystic ovary syndrome have been found to have a much greater level of anti-Müllerian hormone (AMH) compared to healthy individuals, with a three-fold increase. This elevated AMH level is strongly associated with the number of follicles in the ovaries of women with PCOS. Additionally, high levels of AMH pose the highest potential for ovarian hyperstimulation syndrome to emerge. ⁵

The goal of the research was to identify the occurrence, preventive measures, & treatment approaches for ovarian hyperstimulation syndrome at the ART unit of the International Islamic Institute of Population Studies and Research from 2018 to 2020.

2. Patients and methods

This trial included 8660 cases with a high risk of ovarian hyperstimulation syndrome & performed in the ART unit of the International Islamic Institute of Population Studies and Research in the last three years, from 2018 until 2020.

Inclusion criteria: patients with criteria of PCOS, age < 40 years, long agonist or antagonist protocol, high serum E2 (> 4,000 pg/ml) at day of HCG trigger, and multiple follicles (>15) in each ovary.

Exclusion criteria: patients with evident pelvic pathology such as uterine myomas, endometrial polyps, ovarian cysts, endometriosis, etc.

Ethical considerations: This study followed the ethical committee rules of the ART unit at the International Islamic Institute of Population Studies and Research, Al-Azhar University.

Patients were classified according to the severity of the condition. (Mild: mild abdominal pain, bloating & ovarian size under eight cm. Moderate: nausea and vomiting, ascites (detected by ultrasound), moderate abdominal pain. The size of the ovaries ranges from eight to twelve cm. Severe: ascites (clinical), oliguria, HCT > 45%, and ovarian size above 12 cm; critical: tense ascites/large hydrothorax, HCT > 55%, oliguria/anuria, thromboembolism, and ARDS.

Methods of management include being treated at home, admitted to the ward, and admitted to the ICU.

Outcome: techniques of prevention, incidence & treatment of ovarian hyperstimulation syndrome in the ART unit of the International Islamic Institute of Population Studies in addition to Research.

3. Results

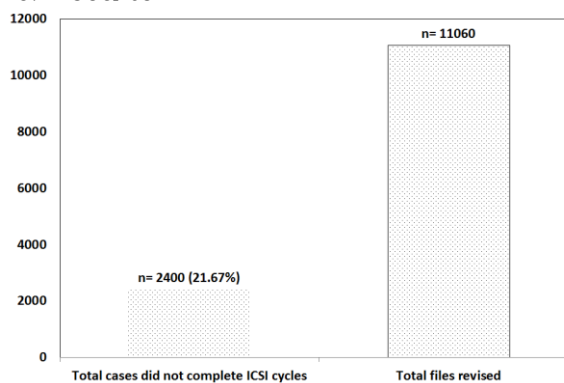


Figure 1. Number of total cases did not complete ICSI cycles among the total number of revised files

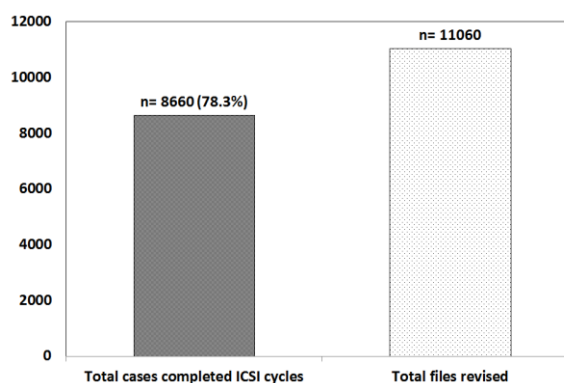


Figure 2. Number of total cases completed ICSI cycles among total files revised.



Figure 3. Number of total OHSS cases among total cases completed ICSI cycles.

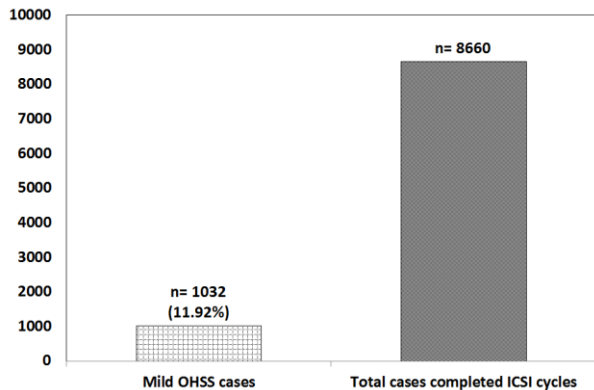


Figure 4. Number of Mild OHSS cases among total cases completed ICSI cycles.

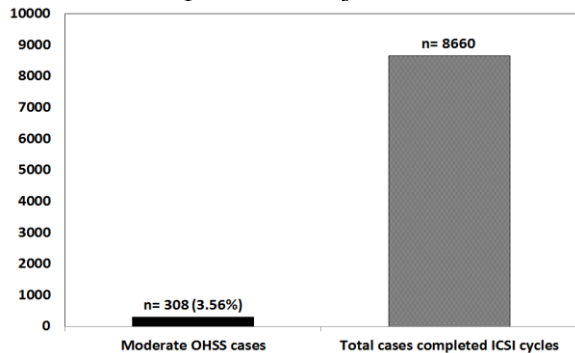


Figure 5. Number of moderate OHSS cases among total cases completed ICSI cycles.

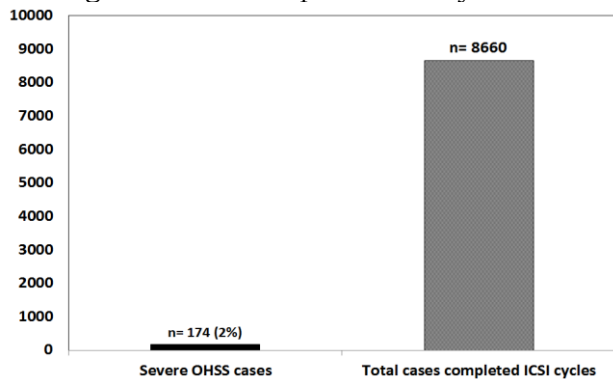


Figure 6. Number of severe OHSS cases among total cases completed ICSI cycles.

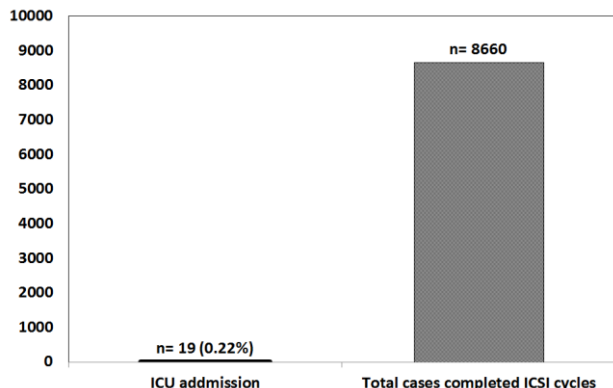


Figure (7): Number of ICU admission among total cases completed ICSI cycles.

4. Discussion

Ovulation induction therapy is a crucial procedure in assisted reproduction cycles. It is important to achieve a specific level of ovarian hyperstimulation during these treatments. However, an excessive reaction can lead to a potentially life-threatening condition referred to as ovarian hyperstimulation syndrome, which must be prevented. ⁶

The prevalence of mild ovarian hyperstimulation syndrome varies from 20 & 33 percent in all in vitro fertilization cycles, with a prevalence of three to six percent for moderate OHSS & severe OHSS occurring in 0.1% to two percent of cycles. ⁷

The mild manifestation of OHSS may be overlooked, as well as its morbidity is likely to be overestimated. The clinical signs of moderate OHSS encompass nausea, abdominal distention, vomiting, & reduced appetite. Approximately 1.9% of individuals require hospitalization due to various complications, for example, acute respiratory distress syndrome, hepatorenal failure, hemorrhage from ovarian rupture, as well as thrombosis. Severe cases of OHSS might potentially lead to mortality. ⁸

The prevention techniques for OHSS can be categorized into both primary & secondary approaches. Primary prevention involves evaluating a patient's characteristics and identifying risk factors in order to address and mitigate them. Secondary prevention facilitates prompt identification and response. The primary measures for ensuring patient safety are deterrence as well as early diagnosis of OHSS. ⁷

The main results of this trial were as follows:

Regarding the patients' criteria who are at great risk of ovarian hyperstimulation syndrome, such as patients with criteria of PCOS, age < 40 years, long agonist or antagonist protocol, high serum E2(> 4,000 pg/ml) at the day of HCG treatment, and multiple follicles (>15) in each ovary.

The current study shows that the prevalence of OHSS in the ART unit of IIPSR Al-Azhar University from 2018 to 2020 was 17.7%.

The mild form represents 11.92% of total cases and 68% of OHSS cases; the moderate form represents 3.56% of total cases. 20% of OHSS cases, severe form represents 2% of total cases and 11.3% of OHSS cases, and patients admitted to IUC present 0.22% of total cases and 0.012% of OHSS cases.

Our study was supported by the Sun et al.⁸ study, which shows results that are close to our study. It was conducted to detect the association between PCOS and OHSS. A total of 2,699 women were reviewed and participated in the current research. These ladies received a diagnosis of polycystic ovary syndrome during their initial in vitro fertilization or

intracytoplasmic sperm injection cycle, which took place from January 2010 to December 2017. Out of the 2,699 women diagnosed with polycystic ovary syndrome who received assisted reproductive technology, 75.2% had a typical reaction to controlled ovarian hyperstimulation (COH), whereas 24.8% experienced ovarian hyperstimulation syndrome. Out of all individuals, 19.5% experienced moderate to severe OHSS, whereas 80.5% had mild ovarian hyperstimulation syndrome.

Our study, supported by El Tokhy et al.⁹ review study on the update of the prevention of ovarian hyperstimulation syndrome, shows that the prevalence of mild ovarian hyperstimulation syndrome is between twenty percent & thirty-three percent in all in vitro fertilization (IVF) cycles with a prevalence of three to six percent for moderate OHSS and severe OHSS occurring in 0.1% to 2% of cycles. Our study was supported by Agrawal et al.⁷ The prevalence of mild ovarian hyperstimulation syndrome is 3–6%, while the incidence of severe OHSS is 0.1–2%, according to a review investigation into the prevention and management of this condition. About 15–30% of in vitro fertilization cycles have the mild type.

Our study was also supported by Humaidan et al.¹⁰ Research on ovarian hyperstimulation syndrome as well as updated reporting criteria for clinical trials reveals that a moderate to severe case occurs in 1–2 percent of women undergoing in vitro fertilization, while lesser forms can arise in 20–30 percent of individuals.

4. Conclusion

A key predictor for the occurrence of moderate to severe OHSS, quickly rising E2 levels (E2 5,000 ng/L), and/or at least 18 follicles on trigger day is an antral follicular count of 24 or higher. When the ovaries are overstimulated, they release vasoactive chemicals, which trigger OHSS. Hemostasis occurs when capillary permeability releases protein-rich fluid into the third space. Enhanced blood clotting & reduced blood flow to vital organs. Among all IVF cycles, 17.7% had OHSS, 11.92% had mild OHSS, 3.56% had moderate OHSS, 2% had severe OHSS; & 0.22% were hospitalized in the intensive care unit.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article

Funding

No Funds : Yes

Conflicts of interest

There are no conflicts of interest.

References

1. Boothroyd C, Karia S, Andreadis N, et al. Consensus statement on prevention and detection of ovarian hyperstimulation syndrome. *Aust N Z J Obstet Gynaecol.* 2015;55(6):523-534.
2. RCOG Guidelines, Feb.(2016).Ovarian hyperstimulation syndrome management (Green top Guideline No. 5. Third edition, 2016; 26(2).
3. Amanvermez R, Tosun M. An Update on Ovarian Aging and Ovarian Reserve Tests. *Int J Fertil Steril.* 2016;9(4):411-415.
4. Goodman, N. F., Cobin, R. H., Futterweit, W., et al. Official Journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists 2015, 21(11), 1291–300.
5. Dewailly D, Andersen CY, Balen A, et al. The physiology and clinical utility of anti-Mullerian hormone in women [published correction appears in *Hum Reprod Update.* 2014 Sep-Oct;20(5):804]. *Hum Reprod Update.* 2014;20(3):370-385.
6. Racca A, Drakopoulos P, Neves AR, Polyzos NP. Current Therapeutic Options for Controlled Ovarian Stimulation in Assisted Reproductive Technology. *Drugs.* 2020;80(10):973-994.
7. Agarwal S, Krishna D, Rao KA. Prevention and Management of Ovarian Hyperstimulation Syndrome. *Int J Infertil Fetal Med* 2019;10(3):46–51.
8. Sunderam S, Kissin DM, Zhang Y, et al. Assisted Reproductive Technology Surveillance - United States, 2017. *MMWR Surveill Summ.* 2020;69(9):1-20.
9. El Tokhy O, Kopeika J and El-Toukhy T. An update on the prevention of ovarian hyperstimulation syndrome *Womens Health (Lond).* 2016 Sep; 12(5): 496–503.
10. Humaidan P, Nelson SM, Devroey P, et al. Ovarian hyperstimulation syndrome: review and new classification criteria for reporting in clinical trials. *Hum Reprod.* 2016;31(9):1997-2004.