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ORIGINAL

EVALUATING THE IMPACT OF COMPREHENSIVE NURSING INTERVENTIONS ON FEMALE ATHLETES WITH OVARIAN HYPERSTIMULATION SYNDROME

Ye Yanqin[1,2], Hu Yueyue[1,2], Sun Zhifeng[1,2,3,4], Xu Shaoyuan[1,2], Tian liu[1,2], Chen juan[1,2], Xiong jin[1,2], Xu Qian[1,2], Zhang Zhenzhen[1,2,*]

[1] Reproductive Medicine Centre, Renmin Hospital, Hubei University of Medicine, Shiyan 442000, Hubei Province, China
[2] Biomedical Engineering College, Hubei University of Medicine, Shiyan 442000, Hubei Province, China
[3] Hubei Clinical Research Centre for Reproductive Medicine, Shiyan 442000, Hubei Province, China
[4] Research Institute of Biomedical Engineering College, Hubei University of Medicine, Shiyan 442000, Hubei Province, China
E-mail: 526258732@qq.com

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ABSTRACT

Objective: This study aims to evaluate the effectiveness of comprehensive nursing interventions on athletes diagnosed with ovarian hyperstimulation syndrome (OHSS), a condition that can significantly affect performance and overall well-being. Methods: We conducted a retrospective analysis of clinical data from female athletes treated for OHSS at our institution between February 2021 and February 2022. A total of 69 patients were categorized into two groups based on the type of nursing care received. The observation group (n=35) received comprehensive nursing interventions, while the control group (n=34) received standard nursing care. **Results:** The observation group demonstrated significantly improved clinical outcomes compared to the control group. This included higher levels of total protein and albumin, better coagulation profiles, and increased levels of estradiol and progesterone, which are crucial for maintaining hormonal balance in athletes ($P<0.05$). Furthermore, patients in the observation group reported higher satisfaction with the nursing care, better psychological state ratings, and fewer symptoms of discomfort, indicating an overall enhancement in quality of life and mental health. **Conclusion:** Comprehensive nursing interventions are highly beneficial for managing OHSS in athletes. These interventions not only improve physiological and

psychological outcomes but also contribute to the overall health and performance capabilities of the athletes. Our findings support the need for continued research and implementation of such interventions to ensure optimal care and recovery for athletes facing this challenging condition.

KEYWORDS: Ovarian hyperstimulation syndrome; Comprehensive nursing intervention; Clinical effects

1. INTRODUCTION

Ovarian Hyperstimulation Syndrome (OHSS) is a complication commonly associated with fertility treatments, particularly those involving stimulation of ovarian function. While OHSS is primarily discussed in the context of reproductive health, its implications extend into the realm of sports medicine, particularly affecting female athletes who undergo such treatments(Velthuis, Hubbard, Longobardi, & D'Hooghe, 2020).The physiological demands of sports combined with the hormonal fluctuations caused by OHSS can significantly impair athletic performance and overall well-being(Karabulut, Korkmaz, Erdem Altun, & Keskin, 2021).

1.1 Physiological Impact of OHSS on Athletes

In OHSS, an excessive response to ovarian stimulation leads to enlarged ovaries and an increase in vascular permeability, which can cause fluid shift from the vascular space to the third space, resulting in complications such as ascites, hemoconcentration, and even thromboembolic phenomena(Karabulut et al., 2021). For athletes, these symptoms are not only detrimental from a health perspective but also impair physical capabilities, stamina, and recovery processes—critical factors for peak athletic performance(Hanada, Kimura, Kitazawa, Morimune, & Murakami, 2021).

1.2 The Role of Comprehensive Nursing in Managing OHSS

Given the severity of OHSS and its potential to drastically impact an athlete's health and career, effective management strategies are paramount. Comprehensive nursing interventions, which encompass not only the physical management of symptoms(Velthuis et al., 2020). But also psychological support and customized care tailored to the needs of athletes, play a crucial(Karabulut et al., 2021) role in managing this syndrome. Such interventions are designed to mitigate the immediate symptoms of OHSS and facilitate a quicker return to training and competition, while ensuring long-term health and performance are not compromised (Fricke, 2022).

1.3 Current Gaps in Research and Practice

Despite the critical impact of OHSS on female athletes, research

focusing on this intersection of sports medicine and reproductive health is sparse. Most studies and protocols are designed for the general population undergoing fertility treatments(Hanada et al., 2021)., with little consideration for the unique needs and challenges faced by athletes. This gap underscores the need for targeted research that addresses specific outcomes related to athletic performance, recovery, and overall health quality in the context of OHSS.

1.4 Objectives of the Study

This study aims to bridge this gap by evaluating the outcomes of comprehensive nursing interventions tailored specifically for athletes suffering from OHSS. By comparing the effects of these specialized interventions against standard nursing care, the study seeks to underscore the importance of a nuanced approach to nursing in enhancing clinical outcomes and improving quality of life for athletic populations.

1.5 Anticipated Contribution to Sports Medicine and Nursing Practice

Through a detailed analysis of clinical data and patient-reported outcomes, this research will provide valuable insights into the effectiveness of comprehensive nursing care for athletes with OHSS. It is anticipated that the findings will contribute significantly to sports medicine and nursing practices, offering evidence-based strategies to enhance care for female athletes undergoing fertility treatments. Ultimately, the study aims to advocate for a shift in how medical care is approached in sports settings, ensuring that female athletes receive care that is not only effective but also conducive to maintaining their athletic commitments and career trajectories.

2. Data / methods

2.1 Baseline data

The clinical data of patients with ovarian hyperstimulation syndrome in our hospital were retrospectively analyzed and the period of collection was from February 2021 to February 2022. The patients were separated into two groups based on the nursing techniques used. Inclusion criteria: (1) Patients met the diagnostic criteria for OHSS (Tsafrir & Weissman, 2021); the OHSS classification in the annex to "Expert Consensus on the Diagnosis and Treatment of Polycystic Ovarian Syndrome" of the Endocrinology Group of the Society of Obstetrics and Gynecology of the Chinese Medical Association was utilized: OHSS classification, including mild level I, mild level II, moderate level III, severe level IV, severe level V, and extremely severe level VI. (2) OHSS has not happened in the past for these individuals; (3) The clinical data of the patients were full; (4) The patients and their families were informed of the research and completed an informed consent form. Exclusion criteria: (1) Patients with serious cardiac illness; (2) Patients with recent significant life

events; (3) Patients with a severe mental history; (4) Patients with tumors, TB, or other disorders.

The average age of the observation group was 30.25 ± 2.88 (26-34); the body mass index ranged from 19 to 27 kg / m2, with an average of (23.55 ± 1.32) kg / m2; the number of retrieved eggs ranged from 5 to 11, with an average of (9.21 ± 2.66); there were 3 cases of mild level I, 2 cases of mild level II, 19 cases of moderate level III, 10 cases of severe level IV, and 1 case of severe level V; the daily estrogen value of night acupuncture was (4256.85 ± 20.22) pg/ml. The average age of the control group was 30.88 ± 2.71 (27-34); the body mass index ranged from 20 to 27 kg / m2, with an average of (23.79 ± 1.41) kg / m2; the number of eggs obtained ranged from 5 to 11, with an average of (9.21 ± 2.08); among them, there were 6 cases of mild level I, 8 cases of moderate level III, 18 cases of severe level IV, and 2 cases of severe level V and the daily estrogen value of night acupuncture was (4250.36 ± 20.10) pg/ml. There was no significant difference in baseline data between the two groups ($P > 0.05$).

2.2 Methods

The patients in the control group received the normal level of nursing care, which consisted of the nursing staff being mandated to provide psychological counseling and enhanced nutritional recommendations to the patients as soon as they were brought to the hospital. Before the patients were allowed to leave the hospital, the nursing staff should have briefed them on the appropriate precautions and urged them to report back to the hospital on time for their subsequent appointments.

The observation group received comprehensive nursing intervention: (1) Mental care: For infertile patients, they have gone through a long period of treatment and diagnosis before receiving IVF treatment, which results in psychological burden in many aspects, including psychology, social, economic and physiology. As the most common complication during ovulation induction, OHSS is iatrogenic and may also lead to the occurrence of delayed transplantation, while for infertile patients, they are often eager to have a successful pregnancy and are not prepared mentally for the results of failure. Especially for pregnant patients, it is easy to aggravate various symptoms and at the same time, they need to face the choice of the termination of pregnancy, so they are prone to a series of adverse emotions, such as depression, anxiety, sensitivity, etc. At the same time, there can also be a sense of guilt, loneliness in interpersonal relationships, extreme behavior, etc., so it is very important to strengthen the psychological counseling of patients. First of all, it is necessary to comprehensively evaluate the psychological status of infertile couples to formulate targeted nursing plans according to their specific conditions, and carry out psychological counseling for patients according to the plan. It is

essential to enlist the assistance of trained psychological counselors for certain patients, such as those who suffer from depression. This is done in order to carry out psychological interventions aimed at lowering patients' negative emotions and providing them with encouragement and support so that they can actively participate in their care and nursing. For example, those who suffer from depression (Vesztergom, Segers, Mostinckx, Blockeel, & De Vos, 2021; R. Yang, Guan, Perrot, Ma, & Li, 2021).

(2) Closely observe the changes of the patients' conditions: First of all, it is necessary to observe whether the patient has gastrointestinal symptoms such as abdominal distension and nausea, and also closely monitor the patients' blood oxygen saturation and respiratory status. It is possible to decrease the patient's vital capacity if the patient has considerable pleural effusion and peritoneal effusion. This may lead to a range of unpleasant symptoms such as shortness of breath, chest tightness, and so on. If the patient has large pleural effusion and peritoneal effusion, it is possible to diminish the patient's vital capacity. Because of the significant increase in pleural effusion, patients are going to have problems breathing. Therefore, nursing staff needs to observe the patients' respiratory state and carry out ECG monitoring on the patients if necessary, and they should closely monitor the patients' blood oxygen saturation and vital signs. During the monitoring process, if the patients' blood oxygen saturation was within 95%, it is necessary to give the medium flow oxygen inhalation, and dynamically observe the various changes.

(3) Nursing of abdominal puncture and drainage: The nursing staff should measure the 24-hour in and out volume of patients every day, especially for the patients' urine volume, and also measure the patients' weight and abdominal circumference, and make a detailed record of their dynamic changes; if there is a significant increase, it is necessary to notify the doctor in time and carry out B-ultrasound examination, so as to judge the dynamic changes of pleural effusion and ascites and whether it needs abdominal puncture drainage. The drainage tube needs to be properly fixed in the process of abdominal puncture and drainage, and the patients should be informed to avoid pulling the drainage tube in the process of turning over, so as to avoid causing adverse conditions of the drainage tube, such as folding, twisting and prolapse to maintain the patency of the drainage tube, and the height of the drainage bag needs to be lower than the level of abdominal puncture, so as to avoid the occurrence of drainage reflux, leading to retrograde infection (Alexopoulou et al., 2021). It's important to consider the drainage material's color, composition, transparency, and amount as well. The color of the ascites is usually light yellow, thick and transparent. In case of abnormal conditions, it is necessary to notify the doctor in time.

(4) Prevention of thrombosis: OHSS is easy to increase the risk of thrombosis due to the influence of many factors, such as the increase of blood

viscosity, blood concentration, high estrogen level, blood hypercoagulability, increased ovarian and ascites venous pressure, etc. Thrombosis often occurs in the heart, lungs, lower limbs, brain and other parts of the human body, among which vascular complications are the most common and serious. For patients with lower limb pain, it is considered that there is potential lower limb venous embolism, so it is necessary to encourage patients to raise their lower limbs and appropriately increase the amount of activity; nursing staff must pay close attention to patients' abnormal symptoms, such as neck pain, chest pain, coughing, limb pain, chest tightness, shortness of breath, and palpitations, for patients with severe OHSS. It's also important to notify the doctor as soon as possible for an early diagnosis and treatment to reduce the patients' pain (Vuong et al., 2021).

(5) Nursing care of drug treatment: Support treatment is generally selected for OHSS. At the same time, attention should be paid to the patients' blood coagulation state, cardiopulmonary function, water and electrolyte balance. During the infusion process, it is necessary to give priority to the input of colloidal solutions, such as albumin and low molecular dextran, etc., which can maintain the osmotic pressure of the colloid and maintain the normal blood volume until the vascular permeability is decreased and the colloidal osmotic pressure is increased, and then the crystal solutions are supplemented. For the treatment of moderate to severe OHSS, the primary treatment measure is to correct low blood volume and electrolyte acid-base balance disorders. When sustained low blood volume occurs, albumin (25% albumin 15 to 20 ml/h for 4 hours) is administered until the symptoms are relieved.

(6) Skin care: The protein content of OHSS patients is very low, and patients are accompanied by poor skin elasticity, systemic edema and other conditions, so for such patients, the nursing staff should tell patients to keep their skin clean and dry, and to keep the bed flat, clean and dry and turn over frequently to prevent the formation of pressure sores. In addition, the nursing staff need to strengthen the operation skills to improve the success rate of venipuncture, and strengthen the inspection efforts to avoid the occurrence of liquid leakage, leading to the aggravation of the disease; for patients with perineal edema, warm water or magnesium sulfate are used for wet compress. The pneumatic treatment of both lower limbs should be carried out twice a day, so as to promote blood circulation; for those whose conditions allow, early ambulation activities are needed to effectively prevent thrombosis.

(7) Diet care: For patients with moderate to severe OHSS, there are often adverse symptoms such as poor appetite, nausea and vomiting, and abdominal distension, and with the need of paracentesis, a large amount of protein is lost. Therefore, it is necessary to encourage patients to eat more and follow the principle of less food and more meals, and the diet should focus on high vitamin, high protein and digestible food, and increase crude fiber food

appropriately; in addition, enteral nutrition support needs to be carried out based on the patients' diet, total blood protein, and albumin indicators. For patients with mild and moderate OHSS, they should be advised to drink more water. For patients with severe OHSS, due to their renal dysfunction, the intake of water and salt should be strictly controlled.

(8) Comfortable nursing: Patients' ward environment should be done well and indoor temperature and humidity should be maintained appropriately, such as the temperature at 18 ℃ and the humidity at 50% ~ 60%, and ward environment should be kept clean, tidy and quiet, and the circulation of indoor air should be maintained (Alexopoulou et al., 2021); in addition, the number of visitors should be reduced as far as possible to avoid irritability caused by adverse factors, resulting in discomfort symptoms, such as vomiting, nausea, etc; the patients is told to keep slow breathing, listen to light music according to their preference, and the method of diverting attention can be used to reduce the anxiety of patients, so as to achieve the purpose of physical and mental pleasure.

(9) Discharge guidance: Before discharge, patients should be informed that they need to strengthen nutrition and ensure adequate sleep and rest. In addition, pregnant patients should be regularly monitored by B-ultrasound, and the time should also be informed. At the same time, the fetal heart rate and the number of pregnancies should be observed; it is necessary to instruct patients to take blood test and check HCG index 2 weeks after IVF-ET for those without pregnancy test, and inform the patients that if they have any discomfort after discharge, they need to contact the doctor in time; finally, the nursing staff need to follow up regularly to understand the situations of patients during pregnancy and do a good job of pregnancy guidance (Hu, Xie, Wang, & Sun, 2021).

2.3 Observation indicators

A comparison was made between the two groups' indicators. Indicator ① estradiol and progesterone levels; indication ② Nursing fulfillment; indicator ③ indexes of serology; indicator ④ indexes for albumin and total protein; indicator ⑤ score for psychological state; indicator ⑥ the frequency of unfavorable effects. The patients were fasting in the morning and had a total of 5 ml of venous blood taken from them before and after the procedure. A chemiluminescence enzyme-linked immunosorbent assay was used to measure the levels of estradiol (E2) and progesterone (P), and the Topol TP750 coagulation technique was used to measure the levels of coagulation function markers in the patients.

Evaluation of the mental condition (Lainas et al., 2020): Hamilton Anxiety and depression scale was selected to evaluate the psychological state of patients before and after nursing. The critical value was 50 points, and the score

was in direct proportion to the patient's psychological state.

2.4 Statistical treatment

Using the SPSS25.00 application, each and every piece of data that was collected for this study was tallied. There was a significant difference if the result was not equal to or greater than 0.05.

3. Results

3.1 Estradiol and progesterone levels in the two groups were compared

After nursing, the estradiol level of the observation group was lower than that of the control group, although the progesterone level of the observation group was greater than that of the control group. This difference was statistically significant (P＜0.05), as shown in Table 1 and Figure 1:

Table 1: Comparison of estradiol and progesterone levels

GROUP	NUMBER OF CASES (N)	ESTRADIOL (PG/ML)		PROGESTERONE (MMOL/L)	
		BEFORE NURSING	AFTER NURSING	BEFORE NURSING	AFTER NURSING
OBSERVATION GROUP	35	4471.56±21.57	5226.52±12.69*	188.71±4.15	215.89±6.21*
CONTROL GROUP	34	4479.11±23.14	5874.22±13.10*	189.24±4.23	202.64±5.99*
T VALUE	-	-1.402	-208.562	-0.525	9.015
P VALUE	-	0.165	0.000	0.601	0.000

Note: *as compared to before nursing, * indicated that P < 0.05.*

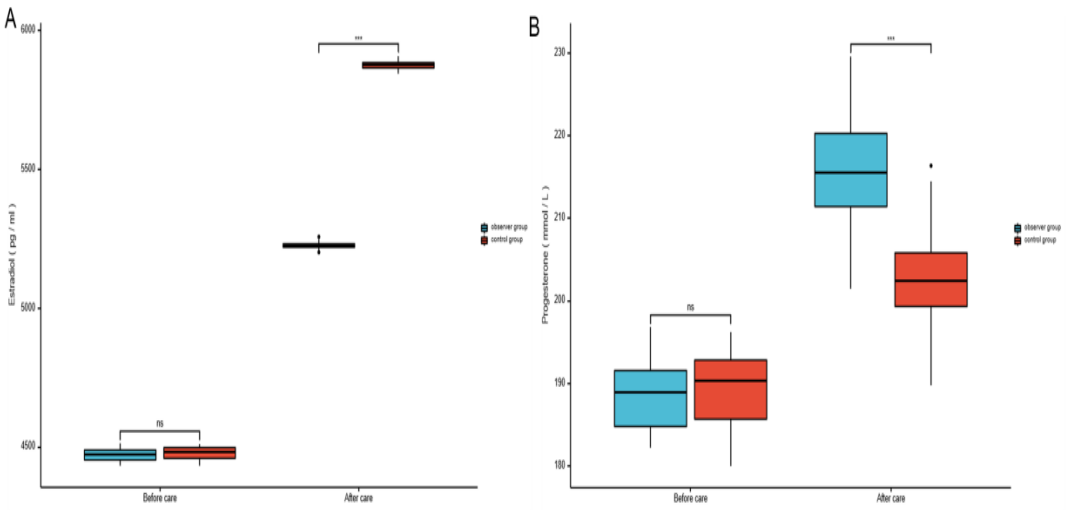

Figure 1: Comparison of estradiol and progesterone levels

3.2 Comparison of the two groups' satisfaction with nursing

As indicated in Table 2 and Figure 2, the nursing satisfaction of the observation group was greater (P＜0.05) than that of the control group:

Table 2: Comparison of the two groups' satisfaction with nursing (n; %)

GROUP	NUMBER OF CASES (N)	VERY SATISFIED	SATISFIED	DISSATISFIED	TOTAL SATISFACTION
OBSERVATION GROUP	35	28	6	1	97.14
CONTROL GROUP	34	20	4	10	70.59
X2	-	-	-	-	9.075
P	-	-	-	-	0.003

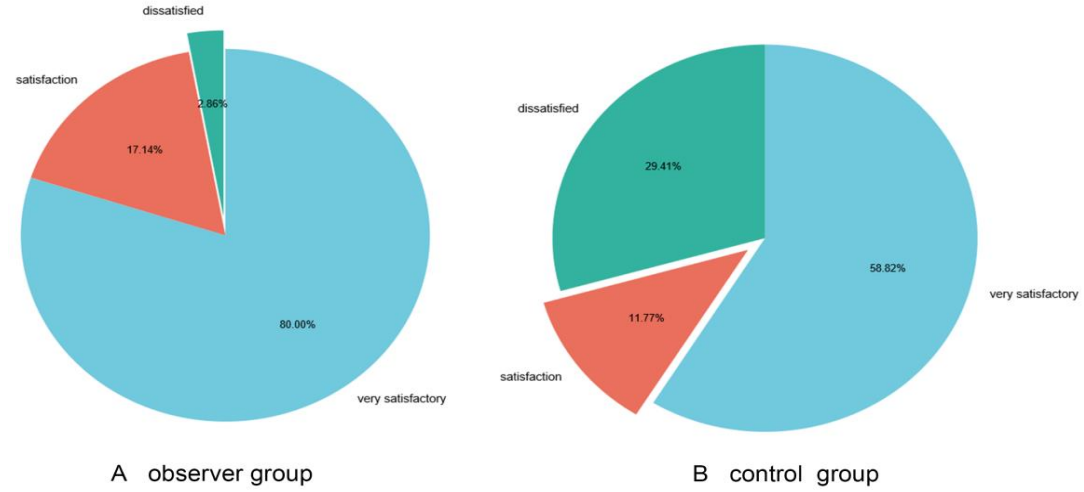

Figure 2: Comparison of the two groups' levels of nurse satisfaction

3.3 Comparison of markers for coagulation function

The coagulation indices before treatment were compared between the two groups(P>0.05). The levels of PT, APTT, and TT in the observation group were greater than those in the control group and FIB levels (P＜0.05) after treatment, as indicated in Table 3 and Figure 3:

Table 3(a): Comparison of markers for coagulation function

GROUP	PT（S）		APTT（S）		TT（S）	
	BEFORE CARE	AFTER CARE	BEFORE CARE	AFTER CARE	BEFORE CARE	AFTER CARE
OBSERVATION GROUP (N=35)	16.52±1.12	13.25±1.02*	38.52±1.02	29.25±1.05*	20.25±1.12	16.52±1.02*

Table 3(b): Comparison of markers for coagulation function

GROUP	PT（S）		APTT（S）		TT（S）	
	BEFORE CARE	AFTER CARE	BEFORE CARE	AFTER CARE	BEFORE CARE	AFTER CARE
CONTROL GROUP (N=34)	16.53±1.14	14.85±1.72*	38.55±1.05	35.52±1.11*	20.35±1.05	18.52±1.79*
T VALUE	0.037	4.716	0.120	24.110	0.382	5.723
P VALUE	0.971	0.000	0.905	0.000	0.703	0.000

Note: *Unlike the pre-care state, * indicated P<0.05.*

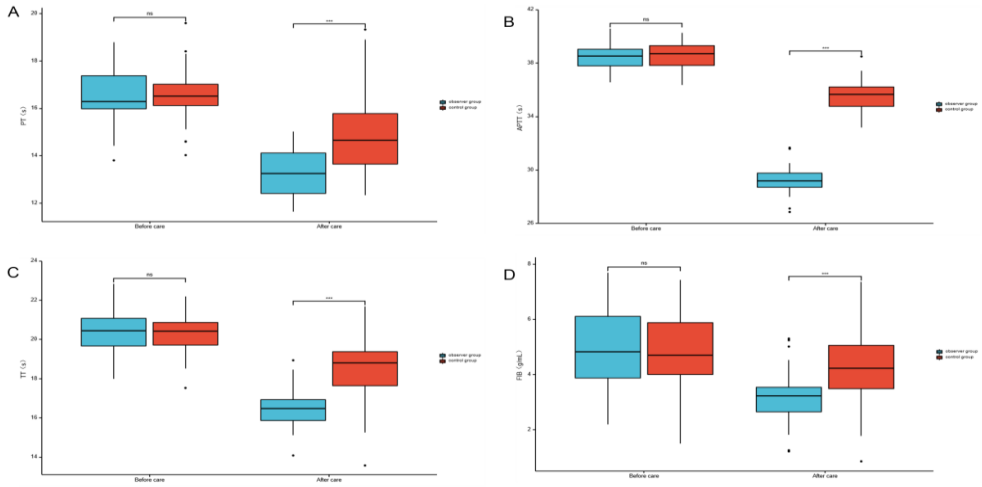

Figure 3: Comparison of markers for coagulation function

3.4 Comparison of total protein and albumin indicators between the two groups

Table 4 and Figure 4 demonstrate that the observation group's total protein and albumin levels were lower than those of the control group (P ＜ 0.05):

Table 4: Total protein and albumin markers are compared (U/L)

GROUP	NUMBER OF CASES (N)	TOTAL PROTEIN		ALBUMIN	
		BEFORE CARE	AFTER CARE	BEFORE CARE	AFTER CARE
OBSERVATION GROUP	35	64.31±1.21	69.14±1.17	35.51±1.21	37.21±2.17
CONTROL GROUP	34	64.11±1.01	65.23±1.27	35.14±1.29	35.19±1.61
T VALUE	-	0.744	13.307	1.229	4.381
P VALUE	-	0.459	0.000	0.223	0.000

Note: *When compared to before breastfeeding, * indicated that P < 0.05.*

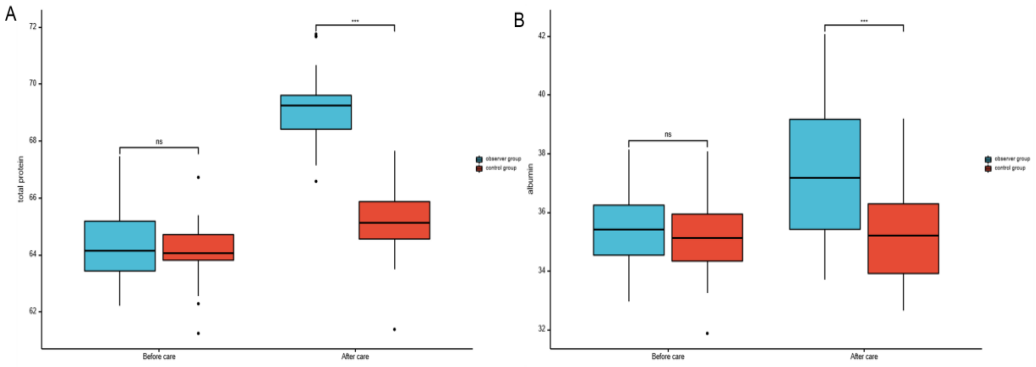

Figure 4: Total protein and albumin markers are compared

3.5 Comparison of the two groups' ratings on mental health

The observation group exhibited more glaring benefits (P＜ 0.05) when the psychological state ratings of the two groups were compared, as shown in Table 5 and Figure 5:

Table 5: Comparing various states of mind (points)

GROUP	NUMBER OF CASES (N)	SDS		SAS	
		BEFORE NURSING	AFTER NURSING	BEFORE NURSING	AFTER NURSING
OBSERVATION GROUP	35	58.43±2.83	40.22±2.03*	56.29±2.14	41.31±2.78*
CONTROL GROUP	34	58.50±2.74	48.59±2.81*	56.38±2.24	48.59±2.02*
T VALUE	-	0.090	13.892	0.155	12.408
P VALUE	-	0.929	0.000	0.877	0.000

Note: *As compared to before nursing, * indicated that P < 0.05.*

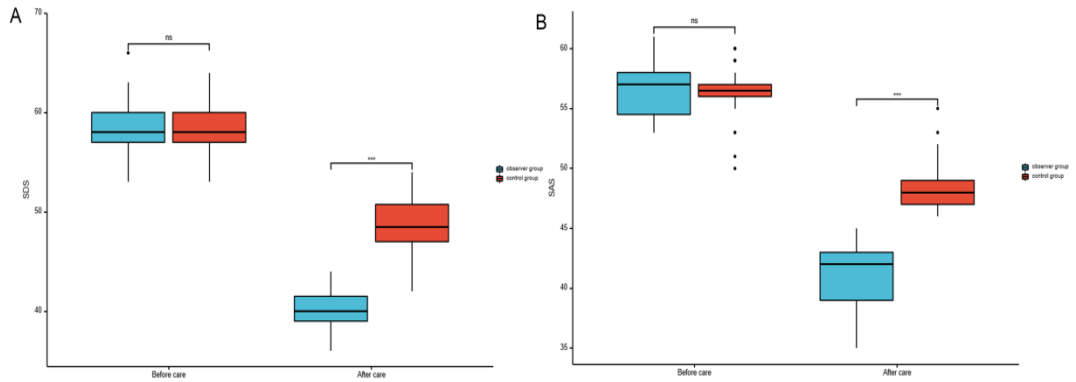

Figure 5: Comparing various states of mind (points)

3.6 Comparison of the two groups' respective incidences of discomfort symptoms

As indicated in Table 6 and Figure 6, the incidence of discomfort symptoms in the observation group was lower than in the control group (P＜0.05):

Table 6: Comparison of the two groups' respective rates of symptom incidence of discomfort (n; %)

GROUP	NUMBER OF CASES (N)	ABDOMINAL PAIN	LUMBAGO	DYSPNEA	TOTAL
OBSERVATION GROUP	35	0	1	0	2.86
CONTROL GROUP	34	1	5	2	23.53
X^2	-	-	-	-	6.498
P	-	-	-	-	0.011

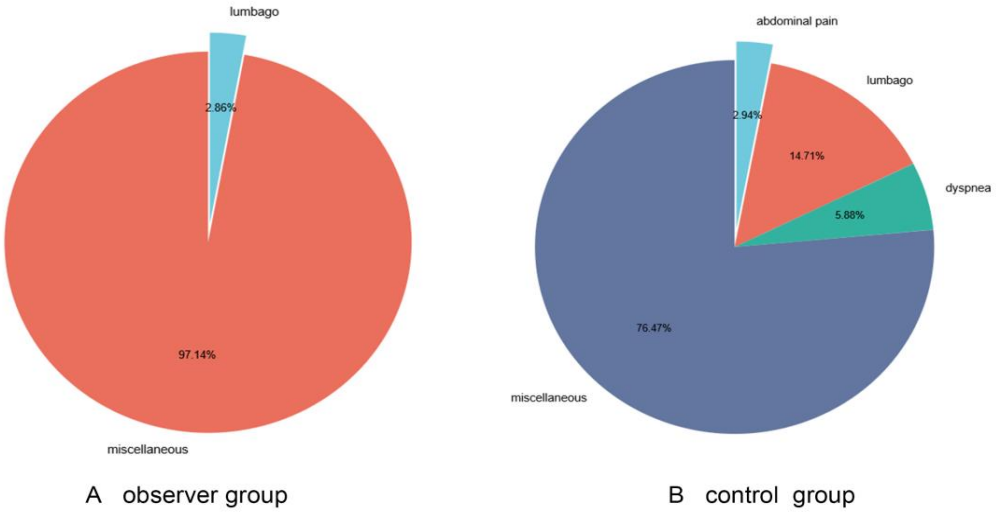

Figure 6: Comparison of the two groups' respective rates of symptom incidence of discomfort

4. Discussion

The frequency of ovarian hyperstimulation syndrome is rising along with the increase of assisted reproductive technologies, despite the fact that it is a relatively uncommon iatrogenic consequence. Ovarian overreaction to gonadotropin stimulation is the primary cause of OHSS, which primarily occurs during the therapy of ovulation induction (Castillo, Llacer, Delgado, Guerrero, & Bernabeu, 2020; Petrenko et al., 2020). OHSS is separated into early onset and late onset subtypes. OHSS is defined as level I (mild), level II (mild), level III (moderate), level IV (severe), level V (severe), and level VI (very severe). Due to the disease's self-limiting nature, the disease's symptoms may diminish

in as little as one to two weeks. Symptoms of pregnancy might linger up two to three months. The clinical mechanism of the condition is still unclear. Although there are several prophylactic strategies, such as oral prednisone, preventive intravenous albumin, lowering the dose of HCG, and reducing the dose of gonadotropin, etc., it is impossible to totally avoid the onset of OHSS. Therefore, it is vital to increase the disease's symptomatic therapy and provide effective nursing intervention (Cheng et al., 2020). At present, the conventional nursing mode is generally selected in clinic, but this nursing mode is lack of foresight. Nursing staff only provide passive nursing services after the occurrence of OHSS in patients, which is difficult to find the potential risk factors of patients in time, resulting in a poor nursing effect (S.-H. Yang et al., 2020). With the deepening of nursing theory research and the continuous expansion of nursing field, the requirements of modern nursing for nursing staff are becoming more and more strict, and it needs to ensure the comprehensiveness and versatility of nursing, solve practical problems for patients, and meet their comprehensive nursing needs to enhance the quality of nursing and improve the clinical symptoms. Comprehensive nursing has the potential to transform passive nursing service into proactive nursing service. This not only allows nurses to completely monitor a variety of nursing activities, but it also enables them to assess challenges from a variety of vantage points, which is necessary in order to achieve the objective of continuously improving the quality of nursing care (Guo et al., 2020; Segal et al., 2020). Through continuous assessment of the patients' conditions and conducting practical nursing measures, the nursing staff can improve the patients' discomfort symptoms. In the nursing process, in order to assess potential risks, the nursing staff must assess the psychological well-being of the patients and examine their medical conditions and eating habits. They must then implement targeted dietary and psychological interventions to lessen the patients' negative emotions and encourage a speedy recovery from illness. In terms of food, patients should be urged to consume a light, high-vitamin, and high-protein diet, and several indicators, such as coagulation function, liver, and kidney function, serum albumin, water electrolyte, and hematocrit, should be periodically checked. For those with hypercoagulable state of blood, they should be instructed to do some appropriate activities, and both lower limbs of patients should be massaged regularly to prevent the formation of deep venous thrombosis (Singh, Reschke, Segars, & Baker, 2020). In addition, the nursing staff need to do a good job in the patients' abdominal puncture care, so as to avoid the compression of pleural effusion and ascites on the lungs, which will cause dyspnea, so that the patients can smoothly get through the dangerous period. In the comprehensive nursing, the targeted nursing intervention for patients combined with different inducements and different disease degrees can effectively prevent the formation of complications, and the intense care that is given to patients may not only prevent the worsening of their condition, but also boost the efficacy of their therapy and increase their chances of survival (Artini et al., 2020;

"Gonadotrophin-Releasing Hormone Agonist Addition for Luteal Support on Pregnancy Outcome in vitro Fertilization/Intracytoplasmic Sperm Injection Cycles:A Meta-Analysis Based on Randomized Controlled Trials," 2020). This study has provided important insights into the effectiveness of comprehensive nursing interventions for female athletes suffering from Ovarian Hyperstimulation Syndrome (OHSS). By systematically analyzing the clinical outcomes of athletes who received tailored nursing care versus those who underwent standard treatment, we have highlighted the significant benefits of a targeted, athlete-centric approach to managing this complex condition.

4.1 Key Findings

Our findings reveal that comprehensive nursing interventions lead to markedly better outcomes in terms of physiological parameters such as total protein, albumin, and coagulation profiles, as well as hormonal levels that directly influence an athlete's health and performance. Moreover, athletes in the comprehensive care group reported higher levels of satisfaction, improved psychological states, and a reduction in discomfort symptoms compared to their counterparts receiving standard care. These improvements are critical not only for the immediate recovery from OHSS but also for the long-term performance and well-being of the athlete.

4.2 Implications for Sports Medicine and Nursing

The results underscore the need for specialized nursing protocols in sports medicine, particularly for conditions like OHSS that have profound implications on an athlete's physiological and psychological health. Sports medicine practitioners and nurses should consider these findings to refine their approaches, ensuring that care plans are not only medically appropriate but also aligned with the athletes' specific needs and sports commitments.

4.3 Future Research and Practice

While this study has made significant strides in understanding and managing OHSS in athletes, it also opens up several avenues for future research. Larger-scale studies involving diverse athletic populations across different sports could provide more generalized conclusions that apply to a broader range of sports disciplines. Additionally, longitudinal studies assessing the long-term impacts of comprehensive nursing on athlete health and career longevity would be invaluable.

4.3 Call to Action

Given the clear benefits of comprehensive nursing interventions demonstrated by this study, there is a compelling case for integrating such practices into the standard care protocols in sports medicine. Training programs

for sports nurses could incorporate specialized modules on handling reproductive health issues, particularly in female athletes, to ensure a well-rounded approach to athlete care.

In conclusion, this study advocates for a shift towards more personalized, holistic nursing care frameworks in sports medicine, emphasizing the necessity to tailor medical interventions not just to the disease but also to the patient's specific lifestyle and professional demands. By doing so, we can significantly enhance the quality of care provided to athletes, helping them not only to recover more efficiently from health setbacks like OHSH but also to achieve optimal performance and career success.

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