Low Dose Corticosteroids in Management of Hyperemesis Gravidarum at Mansoura University Hospital

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Short Running Title:
Corticosteroids in hyperemesis gravidarum.

Precis

Corticosteroids were highly effective in reducing the severity of vomiting after 48 hours from the start of the treatment using Pregnancy-Unique Quantification of Emesis (PUQE) score and improving their quality of life (QOL) score compared with the standard treatment in the control group.

Abstract

Objective: to show the effect of addition of corticosteroids to standard treatment of hyperemesis gravidarum with respect to initial response of treatment, reduction of severity of vomiting , improvement of quality of life and rate of readmission to hospital .

Design: RCT (Canadian Task Force Classification- I).

Setting: Mansoura University Hospitals

Patients: Fifty pregnant women suffering from hyperemesis gravidarum were admitted to department of obstetrics and gynecology, Mansoura University Hospitals.

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Interventions: Patients were randomized into two groups; group 1 (Corticosteroid group; n = 25) and group 2 (non-corticosteroid group; n = 25) at 1:1 ratio.

Measurements and Main Results: The primary outcome was the severity of vomiting after 48 hours after start of the treatment using Pregnancy-Unique Quantification of Emesis (PUQE) score. The secondary outcomes were quality of life after 48 hours and 1 week from starting the treatment protocol using a rating scale with a range between zero (the worst possibly imaginable) and ten (equaled as good as she felt before the start of this pregnancy) , assessment of severity of vomiting after 1 week of start of the treatment using PUQE score , rate of readmission to the hospital within 2 weeks of treatment , extent of ketonuria , and length of hospital stay. The severity of vomiting after 48 hours of start of the treatment using PUQE score decreased significantly in the corticosteroid group, being 10.64 ± 1.62 compared to 11.88 ± 1.64 in the control group. PUQE score after 1 week of start of the treatment was comparable again between the two studied groups. The quality of life (QOL) of patients after 48 hours from starting the treatment score was statistically higher among the corticosteroid group being 5.8 ± 0.8 compared to 4.6 ±1.2 in the control group p value ≤0.05 which continued after 1 week being higher among the corticosteroid group, 8.3 ±0.9 compared to 7.6 ± 0.7 in the control group. The rate of readmission to the hospital for hyperemesis gravidarum within 2 weeks of starting the study was higher among the control group being 32% versus only 4% in the group taking corticosteroids. Also, the median length of stay was higher among the control group, 7 days ranged from 4 to 28 days compared to 4 days ranged from 3 to 12 days in the corticosteroid group.

Conclusions: Corticosteroids were highly effective in reducing the severity of vomiting in HG patients after 48 hours from the start of the treatment using PUQE score and improving their QOL score compared with the standard treatment in the control group.

Keywords: hyperemesis, Corticosteroids, PUQE score, quality of life, ketonuria.

Introduction

In the first half of pregnancy, 50% to 80% of pregnant women experience nausea and occasional vomiting (NVP) which has a significant negative influence on the health and quality of life of the mother (1, 2) .Hyperemesis gravidarum (HG) is a term that is frequently used to describe severe or prolonged vomiting. 0.2-3.6% of pregnant women experience HG, which is far less frequent than NVP. Although it occurs at a very low rate, HG is the leading cause of hospital admission (3, 4) .

As a first line of treatment for hyperemesis gravidarum, hospitalization, intravenous rehydration, and antiemetics are frequently used (5) .The most current studies on NVP treatments state that there is conflicting evidence about the efficacy of pyridoxine (vitamin B6), ginger, and antiemetic drugs (6) . In general, pyridoxine decreases nausea but not vomiting. However, pyridoxine does not have teratogenic effects when combined with antihistamines (H1-receptor blockers as doxylamine and meclizine) and considerably relieves sensations of nausea and vomiting (7). 5-hydroxytryptamine3-receptor antagonists, such as ondansetron, may be used as a second-line treatment after phenothiazines (such as Phenergan) and dopamine-antagonists (such as metoclopramide). They are all said to lessen the symptoms of nausea and vomiting but may have adverse effects on the mother, and potential teratogenic effects are less researched (5).

Although Corticosteroids (CCS) are frequently used to treat nausea and vomiting caused by chemotherapy, there is little data to support their use in the treatment of HG (8). Corticosteroids have resulted in dramatic and rapid improvement in case series of pregnant women with refractory HG.

Corticosteroids should be used after failure of treatment with intravenous fluid replacement and antiemetics .The suggested dose is intravenous hydrocortisone 100 mg twice per day , and convert to oral prednisolone 40–50 mg per day after improvement is achieved , with the dose gradually decreased until the lowest maintenance dose that controls the symptoms is reached (9) . In most cases prednisolone should be continued until the gestational age at which symptoms of HG would have disappeared and in some cases till the delivery(10) .

Materials and methods

Patient population:

A prospective, randomized, and controlled From March 2021 to March 2022 a prospective randomized study enrolled 50 pregnant women with hyperemesis gravidarum admitted at Mansoura university hospital, department of Obstetrics and Gynecology.

The study protocol was reviewed and approved by the Mansoura Faculty of Medicine Institutional Research Board (Code number # MS.21.02.1387) was obtained.

Pregnant woman less than 16 weeks with vomiting more than three times per day for the previous 72 hours not responding to first and second lines of treatment, ketonuria ++ that did not respond to dietary changes, weight loss more than 5 %, or with a second admission for hyperemesis were selected to enroll in our study. Eligible subjects were interviewed, informed about the study, and counseled for participation. They were evaluated regarding the inclusion and exclusion criteria. Women with any of the following criteria were excluded from the study: 1) molar pregnancy; 2) twin pregnancy; 3) contraindications to steroids (glaucoma, and those with cardiovascular disorders, gastrointestinal diseases, liver dysfunction, and acute pyelonephritis); 4) conditions requiring steroid use (systemic lupus erythematosus (SLE) and immunocompromised patients) ; or 5) causes of nausea and vomiting are unknown. A written informed consent was taken from each woman participating in the study.

Allocation and Randomization:

Pregnant women with hyperemesis gravidarum who met the inclusion and exclusion criteria were randomized into 2 groups. Group 1 (corticosteroid group) 25 patients. Group 2 (non-corticosteroid group) 25 patients. The randomization was determined by the patient's identification number kept within closed sealed envelopes. Women with odd identification numbers were selected for the corticosteroid group and those with even identification numbers for non- corticosteroid group.

Methods:

Afterwards the patients were admitted to the hospital, Full history including gravidity, parity, past and surgical history was taken. Clinical examination included vital signs, height, weight, body mass index (BMI), and obstetric examination. Ultrasonography was done to confirm the existence of a normal-appearing intrauterine pregnancy. Laboratory investigations included complete blood count (CBC), serum levels of sodium and potassium, serum creatinine, serum aspartate aminotransferase (AST) and alanine transaminase (ALT), and urine analysis for ketonuria. Arterial blood gas (ABG) samples were examined for any acid base disturbances.

A standard regimen for management of hyperemesis gravidarum for all the study participants were applied and consisted of administration of intravenous crystalloid solutions to correct dehydration, replacing any electrolyte disturbance, correcting acid base disturbance, administration of prophylactic anticoagulant, anti-stress ulcer drugs **(PANTOPRAZOLE 40 mg, PHARO PHARMA)** and anti-emetics (Antihistamines

(EMETREX, AMOUN), Serotonin receptor antagonist **(ZOFRAN 8 mg, SANDOZ)** according to the recent guidelines of the Royal College of Obstetricians and Gynecologists (9).

In the corticosteroid group (25 patients): Beside the standard regimen of treatment, Hydrocortisone 40 mg Intravenous (IV) **(SOLU-CORTIF 100 mg, PFIZER)** (equivalent to 10 mg prednisolone) was given every 12 hours for 2 days then prednisolone 5 mg **(SOLUPRED ORO 5 mg, SANOFI)** oral tablets were given every 12 hours for 5 days.

In the non-corticosteroid group (25 patients): Beside the standard regimen of treatment, 2 cm of IV saline 0.9% every 12 hours for 2 days followed by Folic acid tablets **(FOLIC ACID 5 mg, EPICO)** were administered as 1 tablet every 12 hours for 5 days.

Prednisolone or folic acid was administered to patients in the form of 1 tablet twice daily via standardized tablet dispensers that held a 5 day supply that had previously been packaged.

After 2 days of the start of the treatment. We used Pregnancy-Unique Quantification of Emesis (PUQE) score **figure (1)** to measure the severity of vomiting and assessment of quality of life using a rating scale with a range between zero (the worst that can be imagined) and ten (equivalent to how she felt before the start of this pregnancy) (11) .

After 4 days of the start of the treatment, patients who responded well to treatment (improvement of PUQE Score and quality of life) were sent home with their standardized pill dispensers and told to take the rest of their prescribed medication for a total of five days. Pill counts were used to confirm patient compliance with the study regimen at follow-up visits.

After 1 week of the start of the treatment, assessment of severity of emesis using Pregnancy-Unique Quantification of Emesis (PUQE) score, and length of hospital stay were recorded.

Primary outcome:

The primary outcome was the severity of vomiting after 48 hours after start of the treatment using PUQE score.

Secondary outcomes:

1. Rate of readmission to the hospital for hyperemesis gravidarum within 2 weeks of treatment
2. Quality of life after 48 hours and 1 week from starting the treatment protocol using a rating scale with a range between zero (the worst possibly imaginable) and ten (equaled as good as she felt before the start of this pregnancy).
3. Assessment of severity of vomiting after 1 week of start of the treatment using PUQE score.
4. Length of hospital stay.
5. Extent of ketonuria.

Sample size calculation and power analysis:

The primary outcome was assessment of severity of emesis after 48 hours of start of the treatment using Pregnancy-Unique Quantification of Emesis (PUQE) score. A study done by Jarvis **Sheba and Nelson-Piercy Catherine** (10) examined the effect of corticosteroids in patients with hyperemesis gravidarum, and showed decrease in severity of emesis from 50% to 80% Assuming alpha = 0.05 , beta = 0.2 (power = 80%), and using the 2-tailed Student t test with allocation ratio (1:1), 25 subjects were required in each group to detect a difference of 30% (effect size of 0.6) decrease in the severity of emesis after treatment with prednisolone which was considered to be the least clinically significant effect.

Statistical analysis:

SPSS version 20 was used to analyze the data. The histogram and Kolmogorov-Smirnov test

were used to determine whether continuous data were normal. The Student's t test was used to analyze normally distributed data, which were reported as mean standard deviation. Data that were not normally distributed were shown as median (range) values and were subjected to the Mann-Whitney U test. The chi-square test or Fisher's exact test was used to analyze categorical data, which were given as numbers (percentages). Statistical significance was defined as a P-value 0.05.

Results

As shown in the study flow diagram (Figure 2), Seventy-four patients were assessed for eligibility to participate in the study. Sixteen patients did not meet inclusion criteria and eight patients declined to participate in the study. The final number was fifty patients who were randomized, and data from them (25 patients in the corticosteroid group and 25 patients in the non-corticosteroid group) were analyzed. In the corticosteroid group 3 patients did not respond to treatment, while 22 patients responded, of them 17 patients were discharged by request and 1 patient was readmitted to hospital within 2 weeks. In the non-corticosteroid group 5 patients did not respond to treatment. However, 20 patients responded, of them 11 patients were discharged by request and 8 patients were readmitted to hospital within 2 weeks.

Patients' baseline characteristics (age, height, pre-pregnancy weight and BMI, admission weight and BMI) were similar in the 2 groups (Table 1).

There were no significant differences between the 2 groups in the obstetric history including gravidity, parity, previous abortions, living children, and gestational age (Table 2).

At admission, Pregnancy–Unique Quantification of emesis (PUQE) score was statistically non-significant between both groups. However, the severity of vomiting after 48 hours of start of the treatment using PUQE score decreased significantly in the corticosteroid group, being 10.64±1.62 compared to 11.88±1.64 in the non-corticosteroid group. PUQE score after 1 week of start of the treatment was comparable again between the two studied groups as observed in (Table 3).

As regard the quality of life (QOL) of patients, at admission there was no statistical difference between the studied groups, while after 48 hours from starting the treatment, QOL score was statistically higher among the corticosteroid group being 5.8±0.8 compared to 4.6±1.2 in the non-corticosteroid group p value ≤0.05. This improvement in QOL score continued after 1 week higher among the corticosteroid group, 8.3±0.9 compared to 7.6±0.7 in the control group (Table 4).

Ketonuria was statistically not significant among the studied groups at day 1, day2 and at discharge. Ketonuria at day1 was positive in 96% in corticosteroid group versus 92% in non-corticosteroid group. At day 2 ketonuria improved insignificantly in corticosteroid group more than non-corticosteroid group. At discharge ketonuria improved but insignificantly in both groups (Table 5).

The rate of readmission to the hospital for hyperemesis gravidarum within 2 weeks of starting the study was significantly higher among the control group being 32% versus only 4% in the group taking corticosteroids (Table 6). Also, the median length of stay was higher among the control group, 7 days ranged from 4 to 28 days compared to 4 days ranged from 3 to 12 days in the corticosteroid group (Table 6).

Table (7) shows that no statistically significant difference was observed between the studied groups regarding response to treatment, p value > 0.05. 88% and 80% in the first and second groups response to initial treatment, respectively.

Laboratory investigations on admission showing no statistically significant difference between the studied groups regarding CBC, liver enzymes, blood gases and blood electrolytes, p value > 0.05 (Table 8).

Discussion

This randomized controlled trial demonstrated that corticosteroids were highly effective in reducing the severity of vomiting in pregnant women with hyperemesis gravidarum using Pregnancy-Unique Quantification of Emesis (PUQE) score and improving their quality of life (QOL) score compared with the conventional standard treatment in the control group. Additionally, there were significant differences between groups in the rate of readmission to the hospital for hyperemesis gravidarum within two weeks of the study's beginning and the length of hospital stay.

Our study revealed that corticosteroids were effective in reducing the severity of vomiting in HG patients after 48 hours from the start of the treatment compared to the conventional standard treatment, but this finding was clinically insignificant between the two groups after 1 week from the start of the treatment. Also, patients in the corticosteroids group had higher QOL scores compared to the other control group.

The effectiveness of prednisolone in decreasing symptoms of hyperemesis was studied in two trials. Nelson-Piercy et al (12) compared between oral prednisolone (12 women) and placebo (12 women) .Compared to 5 of the 12 women who received placebo, only 1 of the 12 women who receive prednisolone enrolled in the study during the first HG hospital admission (P = 0.01). Prednisolone group had a mean gestational age of 10.6 2.1 weeks, while placebo group had a mean gestational age of 8.3 ±1.9 weeks. After 1 week of treatment, there was no differences between prednisolone and placebo in improvement of nausea (self-reported using a visual analogue scale (VAS), P=0.10), vomiting (self-reported; relative risk (RR), 1.4; 95% confidence interval (CI): 0.6-3.2) or vomiting more than 5 times per day (self-reported; RR, 2.5; 95% CI: 0.6. Additionally, there were no changes in the effects of switching to intravenous medication when oral therapy failed to produce the desired level of improvement (RR, 2.0; 95% CI: 0.6-6.2) or the need for intravenous fluids (RR, 1.0; 95% CI: 0.2-4.0). But when compared to placebo,, oral prednisolone considerably improved well-being (median VAS improvement, 6.5 vs. 3.5 points; P=0.02).

Ziaei et al (13) compared between oral prednisolone (40 women) and promethazine (40 women). In comparison to women who received promethazine, pregnant women who received prednisolone showed less improvement in their self-reported sickness after 2 days of treatment (no improvement/ becoming worse vs. any improvement) (no or mild nausea: odds ratio (OR), 0.33; 95% confidence interval (CI), 0.0.13-0.86; fewer than three vomiting attacks per day: (OR), 0.22 95% CI: 0.08-0.61; sickness improved: (OR), 0.33; 95% CI: 0.13-0.86. However prednisolone and promethazine were equally effective on all three parameters between days 3 and 10, on day 17, and also 1 week after the end of treatments. Pregnant women in Prednisolone did not experience any drowsiness, whereas promethazine did (0% vs. 15%; P=0.03).

Bondok et al (14), compared between intravenous hydrocortisone (20 women) and intravenous metoclopramide (20 women) in treatment of pregnant women with HG women in intensive care unit (ICU). After one week of treatment, pregnant women who recieved hydrocortisone experienced fewer mean vomiting attacks than those who received metoclopramide (reduction of 95.8 vs. 76.6%; P0.001) after one week of treatment.

In our study there were clinically significant differences between groups as regard length of hospital stay and readmission rates as the median length of stay was higher among the control group, 7 days ranged from 4 to 28 days compared to 4 days ranged from 3 to 12 days in the corticosteroid group and the rate of readmission to the hospital for

hyperemesis gravidarum within 2 weeks of starting the study was higher among the control group being 32% versus only 4% in the group taking corticosteroids.

The length of hospital stays in Nelson-Piercy et al did not change substantially by treatment (median, 7 days for both and placebo prednisolone), but readmission rates were lower in pregnant women who were received prednisolone than in those who were not (RR, 0.6; 95% CI: 0.3-1.4). However, In Bondok et al study (14) did not mention the hospital stay length , none of the 20 women in the hydrocortisone group were readmitted to the intensive care unit, but six of the 20 women in the metoclopramide group were (P 0.001). Yost et al (15) found that there was no difference in length of hospital stay between the methylprednisolone and placebo groups (7.618.0 vs. 4.34.3 days; P=0.18). Comparable hospital readmission rates were seen in both groups (19 of 56 vs. 19 of 54 readmissions; P=0.89).

In our study, Ketonuria was statistically not significant among the studied groups at day 1, day 2 and at discharge, p value > 0.05. Ketonuria at day 1 & day 2 was positive in 96% versus 92% while at discharge was 36% versus 44% among first and second groups, respectively. However, significant cases with Ketonuria were less among the first group.

There is inconclusive evidence that corticosteroids have lethal effect on human fetus development. Prednisolone, the biologically active component of prednisone, is metabolized mostly into the inactive form of prednisone in the placenta. Transplacental transfer of the active forms is limited. It was observed that the amount of active chemicals in fetal cord blood was 10% lower than in the mother. (16). corticosteroids has been associated with an increased risk of preterm birth and preterm premature membrane rupture, but this effect has only been noted with high dosages (17). The study by Rodriguez-Pinilla and Martinez-Frias (18) found a significant effect of first trimester steroid use and cleft lip and palate, but 3 of the 5 cases appear unlikely to be relevant. 1 of the 3 cases received only two doses of prednisolone after 8 weeks of pregnancy, when lip fusion should have already occurred. Another case was associated with several abnormalities, while a third case received replacement doses of hydrocortisone. In a bigger trial, there was no correlation between first-trimester corticosteroids use and oral facial clefts, and the frequencies of oral clefts were comparable between controls and those taking steroids (19). We did not publish neonatal outcomes in our study, however there were no side effects reported from the corticosteroids on the patients during the study.

In conclusion , Corticosteroids were highly effective in reducing the severity of vomiting after 48 hours from the start of the treatment using PUQE score and improving their QOL score compared with the conventional standard treatment in the control group. Other outcomes (severity of vomiting after 1 week of start of the treatment using (PUQE) score, rate of readmission to the hospital for hyperemesis gravidarum within 2 weeks of starting the study, and length of hospital stay) were higher in control group.

Limitations of our study are; the sample size was small as the power was 80% . the current study design neither reported adverse neonatal outcomes nor congenital anomalies after corticosteroids use, and we could not blind the patients because the color of prescribed pills (Folic acid and Prednisolone) was different.

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Figure (1) : Pregnancy-unique quantification of emesis and nausea form (11).

PUQE form

Pregnancy-Unique Quantification of Emesis and nausea

Circle the answer that suit the best your situation for the last 24 hours.

1. On average in day, for how long do you feel nauseated or sick to your stomach?

> 6 hours 5 points	4-6 hours 4 points	2-3 hours 3 points	≤ 1 hour 2 points	Not at all 1 point

2. On average in day, how many times do you vomit or throw up?

≥ 7 times 5 points	5-6 times 4 points	3-4 times 3 points	1-2 times 2 points	Not at all 1 point

3. On average in day, how many times have you had reching or dry heaves without bringing anything up?

≥ 7 times 5 points	5-6 times 4 points	3-4 times 3 points	1-2 times 2 points	Not at all 1 point

Total score (sum of replies to 1, 2, and 3): mild NVP ≤6; moderate NVP, 7-12; severe NVP ≥13.

Quality of life question:

On a scale of 0 to 10, how would you rate your well-being:_____

0 (worst possible) 10 (As good as you felt before pregnancy)

PUQE form modified from: Koren G, Boskovic R, Hard M, Maltepe C, Navioz Y, Einarson A. Motherisk-PUQE) pregnancy-unique quantification of emesis and nausea) scoring system for nausea and vomiting of pregnancy. American journal of obstetrics and gynecology. 2002;186:S228-31, with permission

Figure (2) : Study flow diagram

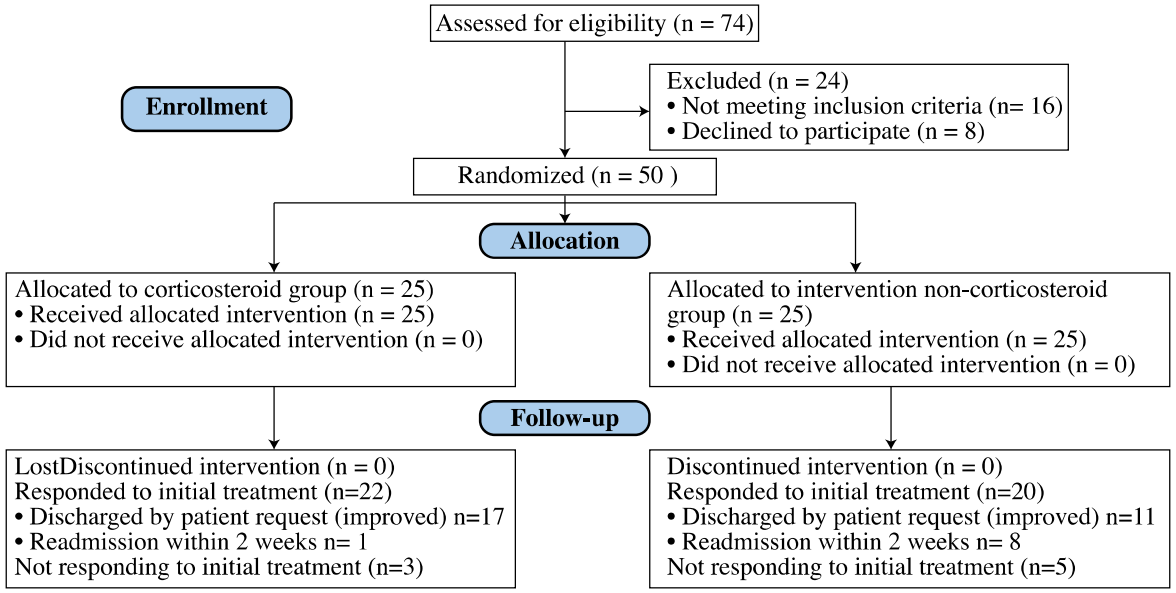

Table 1. Demographic characteristics of the study groups.

	Corticosteroid group (1) (n=25)	Non corticosteroid (2) group (n=25)	Test of significance	P value
Age (years)	26.76±4.11	26.40±5.60	t=0.259	0.797
Pre-pregnancy weight (Kg)	75.04±9.26	75.80±11.60	t=0.256	0.799
Height (Cm)	167.20±3.511	167.52±5.17	t=0.256	0.799
Pre-pregnancy BMI (Kg)	28.03±8.39	25.96±3.24	t=1.149	0.256
Admission weight (Kg)	68.56±9.81	73.48±12.57	t=1.542	0.130
Admission BMI (Kg/m^2)	24.75±2.52	25.01±3.28	t=0.307	0.760

Data are mean ± SD

Table 2. Obstetric history among the studied groups

Obstetric history	Corticosteroid group (1) (n=25)	Non corticosteroid group (2) (n=25)	P value
Gravidity Median (Min-Max) ≤3 >3	 3.00 (1.00- 5.00) 12 (48.0%) 13 (52.0%)	 3.00 (1.00- 5.00) 11 (44.0%) 14 (56.0%)	0.758
Parity Median (Min-Max) Nullipara ≤3 >3	 1.00 (0.00- 4.00) 6 (24.0%) 17 (68.0%) 2 (8.0%)	 1.00 (0.00- 4.00) 10 (40.0%) 12 (48.0%) 3 (12.0%)	0.641
Previous abortion Yes No	 6 (24.0%) 19 (76.0%)	 4 (16.0%) 21 (84.0%)	0.187
Living children No <3 ≥3	 6 (24.0%) 17 (68.0%) 2 (8.0%)	 10 (40.0%) 12 (48.0%) 3 (12.0%)	0.520
GA at admission (weeks)	10.40±2.41	10.12±2.24	0.673

Data are mean ± SD, median (range), or number (percentage).
GA, gestational age.

Table 3. Pregnancy –Unique Quantification of emesis score at different follow up periods.

	Corticosteroid group (1) (n=25)	Non corticos-teroid group (2) (n=25)	Test of signifi-cance	P value
PUQE score at admission	13.84±1.21	14.40±0.70	t=1.99	0.052
After 48 hours	10.64±1.62	11.88±1.64	t=2.68	0.01*
After 1 week	5.96±1.88	6.56±1.75	t=1.16	0.250

Data are mean ± SD.

Table 4. Quality of life at different follow up among the studied groups.

Quality of life	Corticosteroid group (1) (n=25)	Non corticosteroid group (2) (n=25)	Test of significance	P value
Day 1	4.3±1.0	3.8±0.8	t=1.94	0.058
Day2	5.8±0.8	4.6±1.2	t=3.92	≤0.001*
At discharge 8.3±0.9	8.3±0.9	7.6±0.7	t=2.89	0.006*

Data are mean ± SD

Table 5. Ketonuria at different follow up among the studied groups.

Acetone	Corticosteroid group (1) (n=25)	Non corticosteroid group (2) (n=25)	P value
Day 0 +1 +2 +3	 1 (4.0%) 3 (12.0%) 5 (20.0%) 16 (64.0%)	 2 (8.0%) 1 (4.0%) 10 (40.0%) 12 (48.0%)	0.371
Day2 0 +1 +2 +3	 1 (4.0%) 8 (32.0%) 15 (60.0%) 1 (4.0%)	 0 (0%) 8 (32.0%) 10 (40.0%) 7 (28.0%)	0.08
At discharge 0 +1 +2 +3	 16 (64.0%) 8 (32.0%) 0 (0%) 1 (4.0%)	 14 (56.0%) 10 (40.0%) 1 (4.0%) 0 (0%)	0.658

Data are numbers (percentage).

Table 6. Outcome among the studied groups.

Outcome	Corticosteroid group (1) (n=25)	Non corticosteroid group (2) (n=25)	Test of significance	P value
Readmission within 2 weeks of starting treatment	1 (4.0%)	8 (32.0%)	FET	0.023*
Length of hospital stay	4.00 (3.00- 12.00)	7.00 (4.00- 28.00)	t=3.38	0.001*

Data are median (range), or number (percentage).

Table 7. Outcome among the studied groups.

Response to treatment	Corticosteroid group (1) (n=25)	Non corticosteroid group (2) (n=25)	Test of significance	P value
Not responding to initial treatment	3 (12.0%)	5 (20.0%)	FET	0.702
Responding	22 (88.0%)	20 (80.0%)		

FET: Fisher exact test

Table 8. Laboratory investigations on admission among the studied groups.

Laboratory investigations on admission	Corticosteroid group (1) (n=25)	Non corticosteroid group (2) (n=25)	Test of significance	P value
HG	11.39±1.50	11.73±0.97	t=0.958	0.343
HCT	39.10±5.19	40.37±5.20	t=0.867	0.390
WBCs	7.41±2.23	7.76±2.37	t=0.527	0.600
PLTs	229.22±73.82	259.44±66.37	t=1.52	0.135
SGPT	22 (15- 92)	30 (16- 174)	Z=1.81	0.071
SGOT	22 (16- 60)	26 (18- 80)	Z=1.73	0.083
Creatinine	0.62±0.08	0.66±0.09	t=1.71	0.094
PH	7.37±0.06	8.40±5.27	t=0.975	0.334
HCO3	17.74±3.54	17.96±2.60	t=0.241	0.811
Pco2	29.16±6.78	30.70±6.12	t=0.844	0.403
Na	139.56±25.52	149.12±17.63	t=2.99	0.074
K	3.11±0.55	2.93±0.42	t=1.31	0.194