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Evaluation of The Prescribing Practice of Postoperative Fluid Therapy in Comparison with The Guideline Recommendations

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ABSTRACT

Background: The post-operative fluid therapies are considered a key part of surgical care and have attracted more attention and importance over the last period because of their remarkable impact on post-surgical outcomes. Several studies showed inappropriate and suboptimal therapy of intravenous fluid and associated with many compactions such as Weight gain due to fluid overload and electrolyte abnormalities. Therefore in 2013, a new guideline had been initiated by the National Institute of Health and Care Excellence dealing with fluid therapy in adults. This study aims to assess the current practice of fluid therapy versus the guideline.

Methods: The study was a prospective observational with 105 patients match the eligibility criteria and only 84 are included. The patient's body weight, amount of fluid given to patients were calculated and compared to guideline also, serum sodium and serum potassium measured before and after fluid therapy.

Results: The main results of this observational study demonstrated that the amount of fluid is significantly higher than the recommended amount by a guideline and lack of correlation with the body weight. Also, the body weight increased and serum potassium decreased significantly after two days of fluid therapy. Increased incidence of electrolytes abnormalities and trend of use of more saline containing fluids with less ringer was also observed.

Conclusions: The data of current practice collectively indicated that extra amounts of fluid were prescribed resulted in increasing body weight of patients and appearance of electrolytes disturbances.

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I. INTRODUCTION

Intravenous fluid therapy is considered as one of the major treatments used in post-operative care and in the last few years such therapy took considerable attention. The main reason behind the use of IV fluids is either to maintain or to restore fluid and electrolyte balance or also to correct acid-base imbalance[1]. Despite the importance of fluid therapy and being a conjoint part of medical care, there is no consensus about the kind of fluid that should be prescribed and the amount to be administered[2] many cases of inpatient have been shown suboptimum management of fluid therapy and lead to complications for instance imbalance of fluid and electrolyte, edemas and dysfunction of organs[1].

The 1999 report of the UK National Confidential Enquiry into Perioperative Deaths (NCEPOD) has emphasized that fluid imbalance leads to serious postoperative morbidity and mortality because of fluid infusion in too much or too little amount, and estimated that 20% of the patients studied had either poor documentation of fluid balance or unrecognized and untreated fluid imbalance[3].In 2001 cross-sectional study done by Lobo et al.(UK) revealed that 25% of surgeons prescribed more than 4 pints (2L) of 0.9% saline each day and more than half of surgeons did not check fluid data before prescribing [4], [5]. Walsh and Walsh 2005 in the UK as well as Ferenczi et al., 2007 (UK) showed that physicians did not check patients body weight, serum electrolyte, ongoing fluid loss and fluid prescribed. Also found that 17% of patients established significant fluid associated morbidity due to fluid overload[5]–[7]. Lobo in 2006 (UK)found that mortality increased to about30% in the patients who gained more than 10% of body weight and increased to 100% with patients who gained more than 20% of body weight[8]. Walsh et al., 2008 (UK) showed no correlations between routinely available fluid balance parameters and the quantities of fluid and electrolytes prescribed, and more than half of studied cases (54%) established at minimum one fluid-associated complications[5], [9].

A report in 2011, launched by NCEPOD had highlighted that risk of death is amplified for patients within thirty days after surgery if they prescribed too little or extra IV fluid preoperatively [5], [10]. That's why in December 2013, NICE printed a new guideline, has better attention to improving the prescribing of IV fluid therapy[11] and since the appearance of the NICE guideline in 2013 till now there is no study has been done in Iraqi's hospital to determine if fluid therapy is aligned with the guideline or not thus this study was done to evaluate fluid therapy practice and compare it with the guideline.

II. Materials and Methods

Study Design

The work was an observational prospective study carried out at ALHilla Teaching Hospital in the General surgery ward from November 2017 till July 2018. The study was designed to evaluate the current practice of fluid therapy. Patients included in the study are those who were planned for elective surgery and received intravenous fluid s for at least 48hrs after surgery and about one hundred and five patients met the eligibility criteria and administered postoperative fluids and out of those only eighty-four patients

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were included and enrolled in the study because 21 patients are excluded due to electrolyte abnormalities before starting fluid therapy. This study is approved by The Ethics and Scientific Committee of the Faculty of pharmacy/ Kufa University and also the Scientific Committee of Researches of babel Health Directorate.

Study parameters

In the study, the total amount of fluids was measured by following the patient's fluid administration over 48 hrs. post-surgery and the administered amount of fluid on days one and two were identified and compared with the calculated amount according to a nice guideline for routine maintenance of fluid therapy (25-30 ml/kg/day).

In this study, we measured also the bodyweight before administration of fluids and considered it as a baseline then measured and also measured after 2 days of administration of intravenous fluids. The body weight measurement was done by using a standard personal scale (ROHS)^{R}. In addition to that, serum electrolytes were measured specifically serum sodium and potassium by using Electrolyte Analyzer GENIUS GE 300 and (Geruni)^{R} kits before giving fluid therapy as a baseline and after 2 days of

fluid therapy. Also, we determined the electrolyte abnormalities by depending on the normal ranges of sodium and potassium where any levels of patients above this range considered hyper. and below it is named hypo.

Statistical analysis

The data expressed as Mean ± standard error mean (SEM) or percent and frequencies.

One sample T-test was used to compare the numerical variables before and after fluid therapy. Pearson correlation coefficient was calculated. For all statistical analyses, P value below 0.05 was considered statistically significant using a two-tailed test. Statistical analysis of data was accomplished by means of the Statistical Package for Social Sciences software version 23.0 (SPSS, Chicago, IL).

III. **Results**:

1- Baseline characters of the patients

The study 84 patients were enrolled in the statistics analysis most of them female adults with a mean age of 36.8 and 69% female (Table 1).

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Table 1: Patients characters

Variables	Characters
Age (years)	36.8±1.6
Gender (male-female)	(31%-69%)
Weight	65.7±1.5
HR	90.7±1.4
SBP	124.5±1.7
DBP	77.2±0.9
Type of surgery	Appendectomy (29%)
	Laparoscopic cholecystitis (30%)
	Hernia (13%)
	Thyroidectomy (7%)
	Intestinal and colonic surgery (10%)
	GUT surgery (8%)
	Others (3%)

2- Amount of postoperative fluid prescribed to the patients

The current prescribing practice on the first and second day of post-operative fluid administration showed that the amount of fluid prescribed was significantly (p=0.001) higher than the amount of fluid calculated according to the guideline (fig.1). In addition to that, there was no correlation between the volume of fluid prescribed practically with the bodyweight with R2= 0.0066.

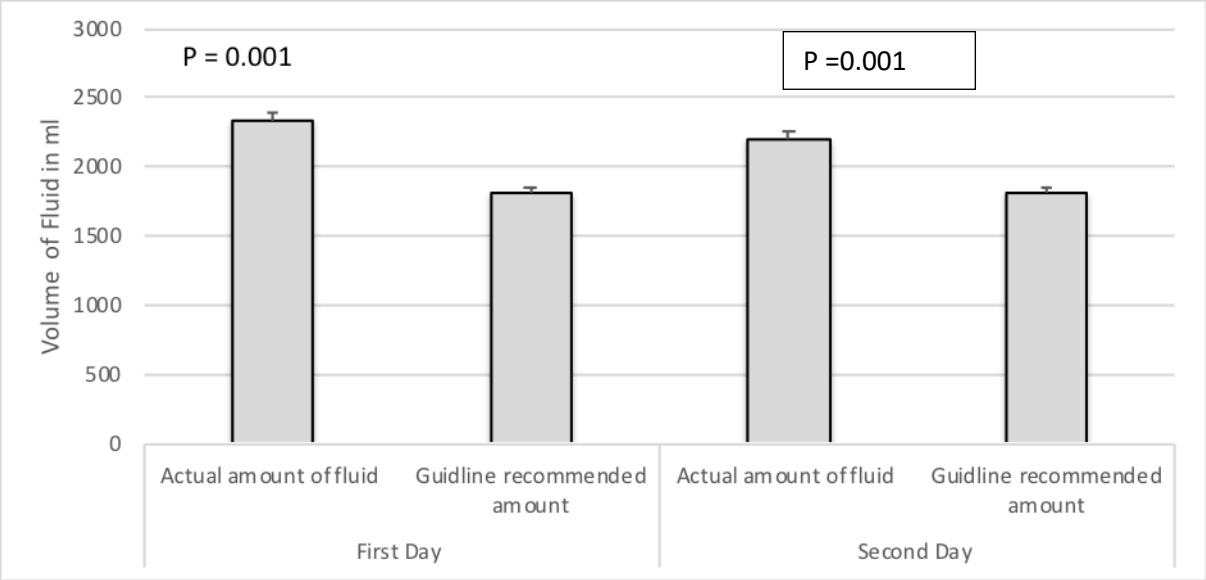

Fig 1: Comparison of the actual amount of fluid given to the patients with the guideline-recommended amount by using paired *t*-test data express as Mean ±SEM

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3- Change in body weight after two days of Fluid therapy.

In our observational study, after two days of fluid therapy postoperatively we noted a significant (p=0.0001) increase in body weight compared to baseline before giving fluid therapy (fig.2). as there was an average increase of about a half kilogram in the bodyweight after fluid therapy.

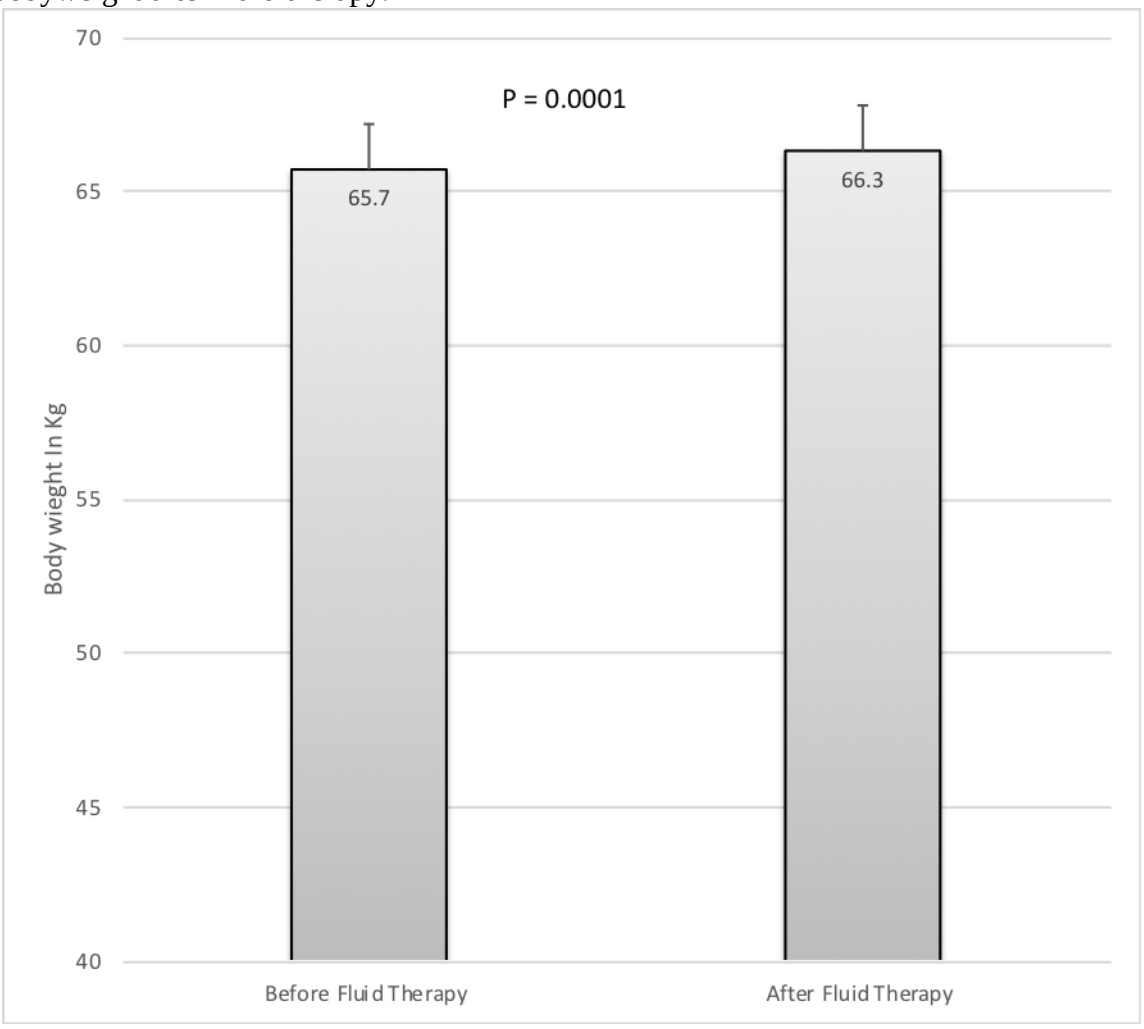

Fig 2: Bodyweight of the patients before and after two days of fluid therapy compared by using paired t-test data express as Mean ±SEM

4- Change in serum electrolytes after two days of Fluid therapy

Following 2 days of post-operative fluid administration serum sodium has been increased but this increase did not reach the level of statistical significance compared to baseline (fig. 3).

While regarding serum potassium the serum levels decreased to statistically significant compared to values before giving intravenous fluid (fig.4).

In our prospective work, we noted that after two days of fluid therapy the current practice electrolyte abnormalities in about thirty-two percent of the patients reflected by nineteen percent with hypernatremia, six percent with hyponatremia and seven percent with hypokalaemia (fig.5).

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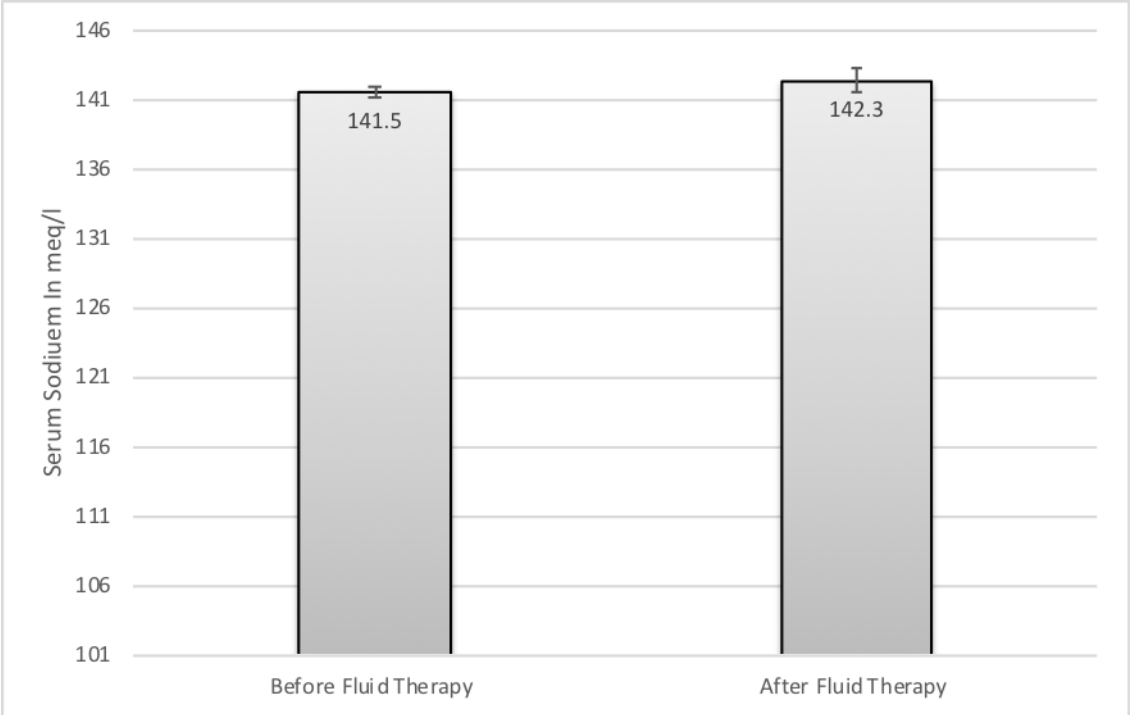

Fig 3: Serum Sodium of the patients before and after two days of fluid therapy compared by using paired t-test data express as Mean ±SEM

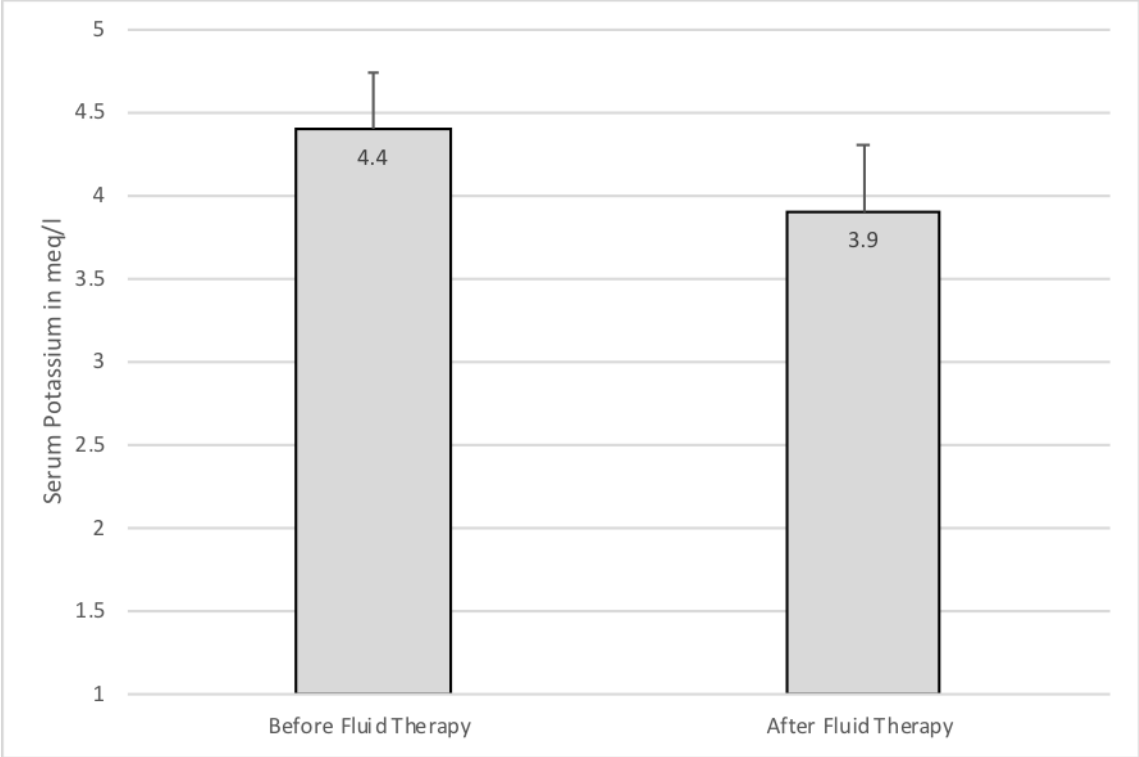

Fig 4: Serum Potassium of the patients before and after two days of fluid therapy compared by using paired t test data express as Mean ±SEM

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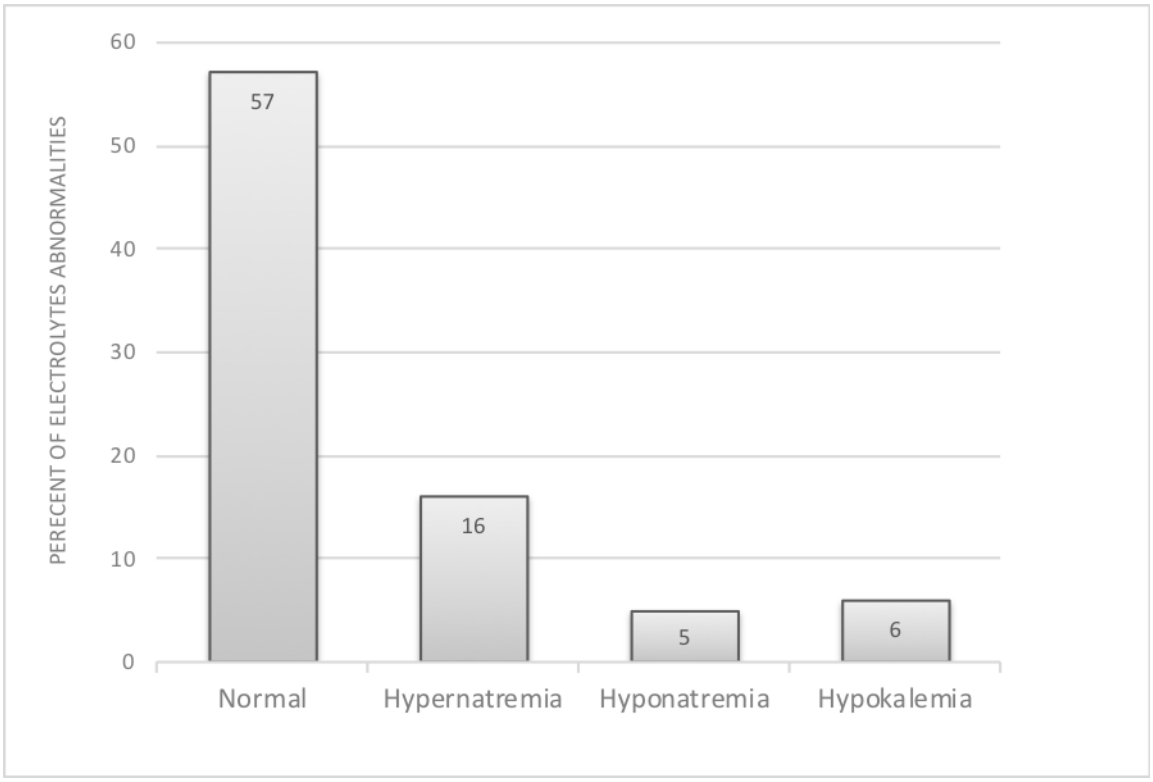

Fig 5: Percent of patients with electrolytes abnormalities after two-day fluid therapy

5- Type of fluids administered during two days of postoperative fluid therapy.

This observational study found that the most frequently prescribed fluid in the first and second-day post-surgical was saline-containing fluid represented by a higher percentage of glucose saline followed by normal saline while ringer characterizes the rarely administered intravenous fluid among patients (fig.6).

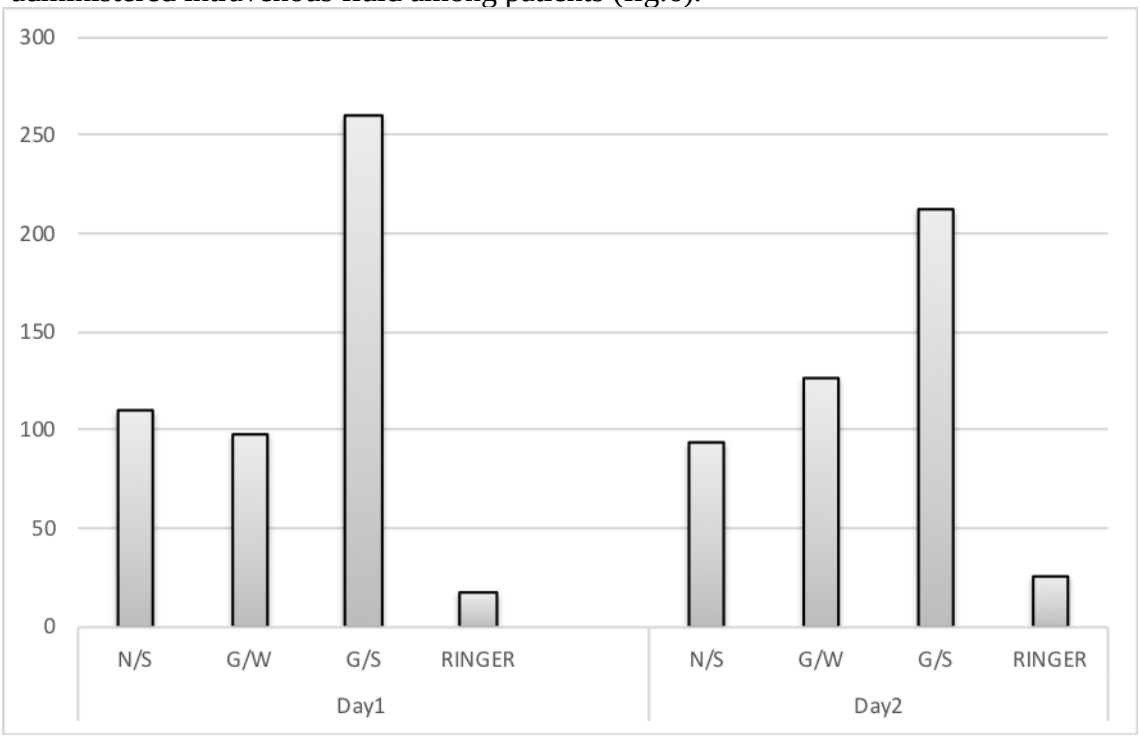

Fig.6: Types of intravenous fluid commonly prescribed postoperatively.

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IV. Discussion

The main findings of the present prospective study indicated that the current practice of postoperative fluid therapy showing high amounts of fluid given to patients on day one and day two and not considering the body weight in the calculation of the prescribed volume of fluid to be administered. Also, we noted a significant increase in body weight after 2 days of receiving intravenous fluids compared to the baseline value because of the administration of a higher amount of fluid.

This pattern of inappropriate fluid therapy was noted in previous studies. Consistently, In an observational audit showed that the amount of fluid prescribed was variable and with not considering body weight also in the calculation the prescribed amount of fluid [12]. Another similar finding of results was observed in the UK study, which revealed that an extra amount of fluids was given to the most of patients and the amount not related to their body weight[9]. Furthermore increasing body weight as a result of administration of high volumes of intravenous fluid was also mentioned in another clinical study [13].

The other more important findings in this study were increasing incidence of fluid-associated complications after two days of postoperative fluid therapy as indicated by the trend in increase and a remarkable decrease in serum potassium, as well as increase in the incidence of electrolyte abnormalities due to fluid administration, were also noted. Higher incidence of hypernatremia mainly attributed to the predominant trend of prescribing of sodium chloride containing fluid and less prescribing of electrolytes free waters and the reasons for decrease in serum potassium and incidence of hyponatremia were lack of potassium supplement and less ringer fluid administration. These results were in agreement with other data in a prospective study, showed that patients received a high amount of fluid and sodium with less than required potassium and developed hypokalemia[6]. Furthermore, another audit revealed that more than 50% of the post-operative patients developed electrolyte disturbances as hyponatremia, hypernatremia, hypo and hyperkalemia, and fluid overloading due to administration of extra sodium and less potassium[9].

Regarding using saline containing fluids in great percent these results come true in what was found by a survey in 2001 which demonstrates that about 25% of the surgeons prescribed more than 500 ml of 0.9% saline [4]. Such inappropriate use of more sodium-containing fluids could develop electrolyte abnormalities [14] and even disturb organs normal functions and post-surgical outcomes [8]. these data confirming that the current practice of fluid therapy was not optimal and not consistent with NICE guideline of fluid therapy and this might be explained by an awareness of medical staff about the guideline and lack of attention to the importance of fluid and its effect on patients outcome therefore multifaced educational program to increase knowledge and awareness about fluid therapy guideline is recommended [15].

Conclusions

Collectively the data from our observational study demonstrate that the current practice showed high volumes of intravenous fluids prescribed to the patients with trend of using saline containing fluids in high percent resulted in fluid overload as evident by increase in body weight and increase the incidence of abnormalities in serum electrolytes of patients postoperatively.

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تقييم ممارسة وصف علاج السوائل الوريدية بعد العملية الجراحية مقارنة بالتوصيات التوجيهية

سارة كاظم عبود \ فرع الصيدلة السريرية والعلاجيات كلية الصيدلة \ جامعة الكوفة

حيدر جاسب عصاد اللامي//كلية الصيدلة جامعة بغداد

المقدمة: تعتبر علاجات السوائل الوريدية بعد العمليات الجراحية جزءاً رئيسياً في الرعاية الجراحية وقد اجتذبت المزيد من الاهتمام والأهمية خلال الفترة الماضية بسبب تأثيرها الملحوظ على نتائج ما بعد الجراحة. وقد أظهرت العديد من الدراسات وجود العلاج غير المناسب وغير المثالي للسائل الوريدي و التي ترتبط بدورها بالعديد من المضاعفات مثل زيادة الوزن بسبب زيادة حمل السوائل وشذوذ الاملاح. ولذلك في عام 2013، بدأ المعهد الوطني للصحة والرعاية الممتازة في وضع مبادئ توجيهية جديدة تتناول العلاج بالسوائل لدى البالغين. كما وتهدف هذه الدراسة لتقييم الممارسة الحالية للعلاج بالسوائل مقابل المبدأ التوجيهي.

الطريقة: تضمنت الدراسة رصد 105 مريضا 84 فقط منهم قد طابقوا المعايير الخاصة بالدراسة. تم حساب وزن جسم المريض، وكمية السائل المعطى للمرضى ومقارنته بالمبدأ التوجيهي أيضا، الصوديوم والبوتاسيوم في مصل الدم تم قياسه قبل وبعد العلاج بالسوائل.

النتائج: أظهرت النتائج الرئيسية لهذه الدراسة الرصدية أن كمية السائل أعلى بكثير من الكمية الموصي بها من قبل التوجيهي وقلة ارتباطها مع وزن الجسم. أيضا، زيادة وزن الجسم وانخفاض البوتاسيوم في الدم بشكل ملحوظ بعد يومين من العلاج السائل. كما لوحظ زيادة حدوث تشوهات الاملاح والاستخدام المتزايد للسوائل المحتوية على محلول ملحي أكثر من غيرها.

الاستنتاجات: إن بيانات الممارسة الحالية مجتمعة أشارت إلى أن كمية إضافية من السوائل قد وصفت مما أدى إلى زيادة وزن الجسم وظهور اضطرابات الاملاح.