Impact of adrenal insufficiency in catecholamines and fluid requirement in severely burned patients

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No conflicts of interest

INTRODUCTION

- Extensive burns were associated with capillary damage responsible for massive plasma extravasation into burned tissues with consequent hypovolaemia and shock.

- Relative adrenal insufficiency (RAI) was a common complication in severely burned patients and may major burn shock.

- Fluid resuscitation, catecholamines and hydrocortisone were essential treatment strategies.

OBJECTIVE

The goal of the current study was to assess the impact of RAI in catecholamine administration and fluid requirement in severely burned patients.

DEFINITIONS

❑ *RAI:*

- Denoted by the increment from baseline to peak cortisol level after a short ACTH stimulation test (Synacten test)

- Adrenal insufficiency was defined by a response ≤ 9 µg/dL [Delta-Cortisol:**T0-T60** < 9 µg/dL].

- Burns: recognizing RAI may be crucial for management and outcome

1- Annane D et al.JAMA **2002 ;862-71.**
2-Cooper MS.. N Engl J Med. **2003;348:727-734.**

PATIENTS/ METHODS

- Prospective study.
- Conducted in a 20-bed adult burn ICU at a university –affiliated teaching hospital in Tunisia.
- Period: 8 months (February to September 2012)

Inclusion criteria:

- Age≥ 18 years old.
- TBSA ≥ 20%
- First 24h from the thermal injury

Exclusion criteria:

- History of adrenal insufficiency, or steroid therapy within 6 months prior to burns.
- Pregnancy.

- Resuscitation volume: Parkland formulae (4 ml/Kg/% burn).
- Goals of resuscitation:
  - Mean arterial pressure (MAP)≥ 65 mmHg
  - Hourly urine output (HUO) ≥ 0.5 ml/kg/h

SHORT CORTICOTROPIN STIMULATION TEST

- At admission : A short corticotropin test (250 µg de ***SYNACTHENE***®) was performed, and cortisol levels were measured at baseline (***TO***) and 60 minutes post-test (***T60***)

- After test, enrolled patients received, hydrocortisone as follows: a bolus of ***100 mg*** followed by ***0.18 mg/kg/h in*** continuous infusion.

- Norepinephrine dose and resuscitated volume were assessed every 24 hours during 3 days in all patients.

DATA ANALYSES

- Data analyses were carried out using SPSS software (version 20)
- Comparisons between the characteristics of the two groups of patients classified by the test as non-responders and responders are performed by mean comparison tests of Kruskal-Wallis for quantitative variables and by CHI2 tests for categorical variables.
- For continuous variables, descriptive statistics were calculated and reported as mean ± SD.
- Differences were considered significant at $p < 0.05$.

RESULTS

Over 8 month period :

- ✓250 patients were admitted
- ✓ 18 patients were enrolled

- ❑ ***Age (years old)***: 43 ± 15
- ❑ ***Sexe-Ratio:*** 13H/5F
- ❑ ***TBSA (%)***: 41 ± 13 (extremes: 22 - 73%)
- ❑ ***UBS:*** 91 ± 74

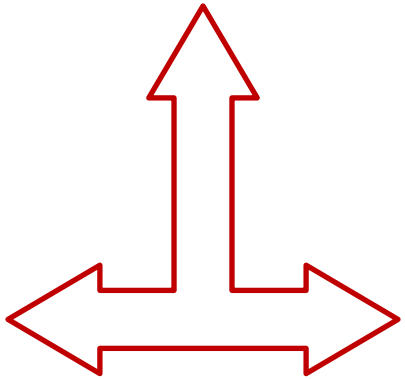
RESULTS

N=18

Corticotropin Test Stimulation

G1

G2



RAI (+)

N= 7 (39%)

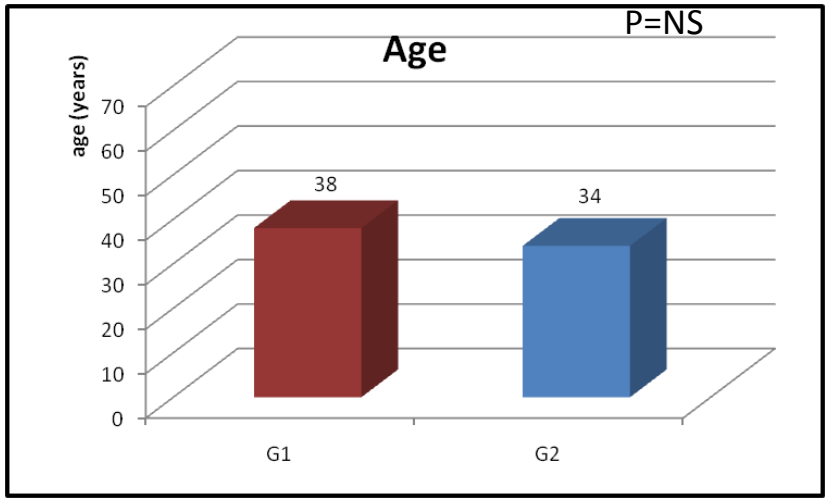
RAI (-):

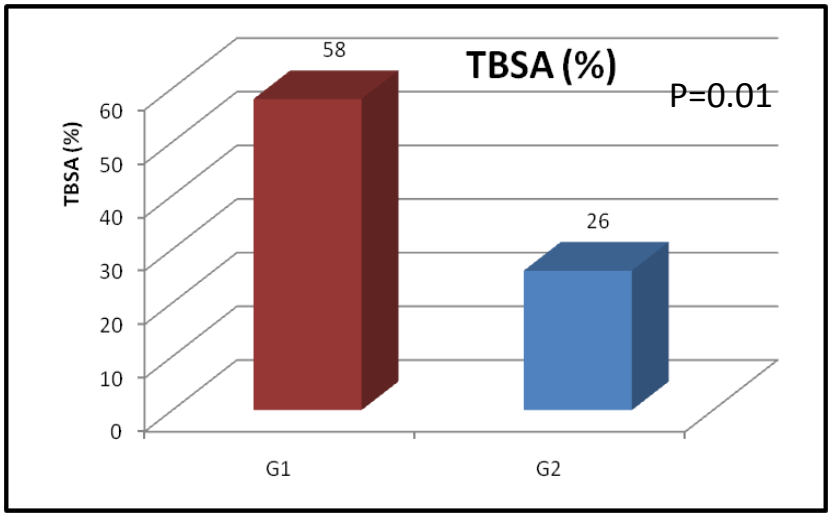
N= 11 (61%)

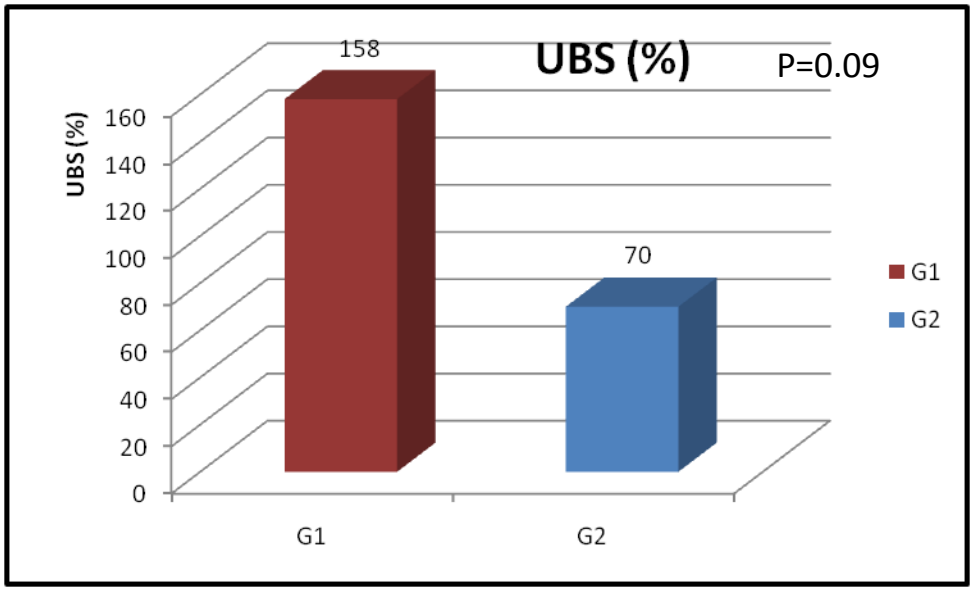
INCIDENCE RAI: 39%

In ICU : 40 à 80%

RESULTS


Age
P=NS
age (years)
70
60
50
40
30
20
10
0
38
34
G1
G2


TBSA (%)
P=0.01
TBSA (%)
60
50
40
30
20
10
0
58
26
G1
G2


UBS (%)
P=0.09
UBS (%)
160
140
120
100
80
60
40
20
0
158
70
G1
G2
G1
G2

RESULTS

BASELINE CORTISOL LEVEL (T0)

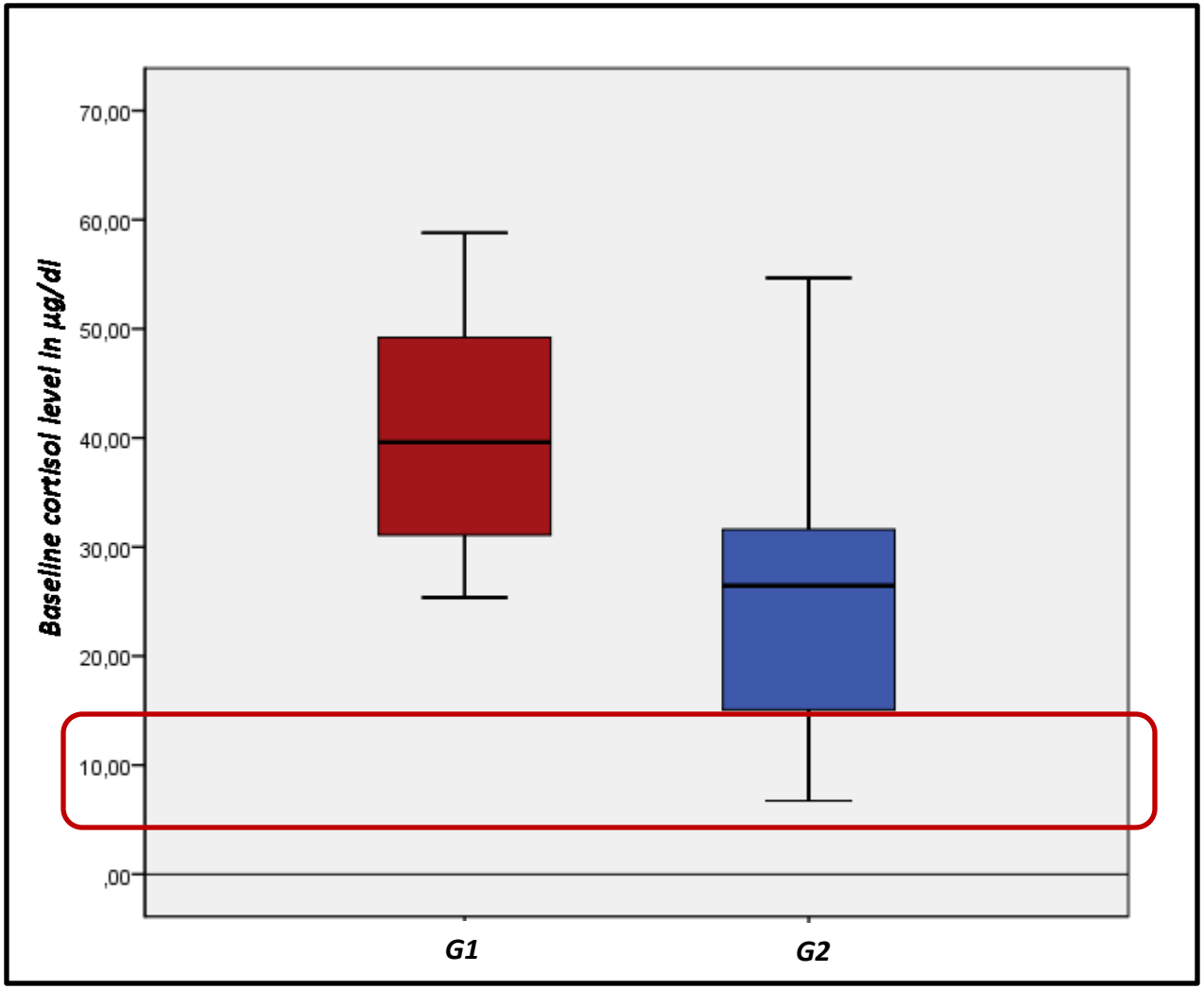
***The median baseline Cortisol level* was:**

- G1: ***40 ± 12 µg/dl* (moy)**
- G2: ***26± 15 µg/dl* (moy)**

Extreme values*: *6 to 58 µg/dl

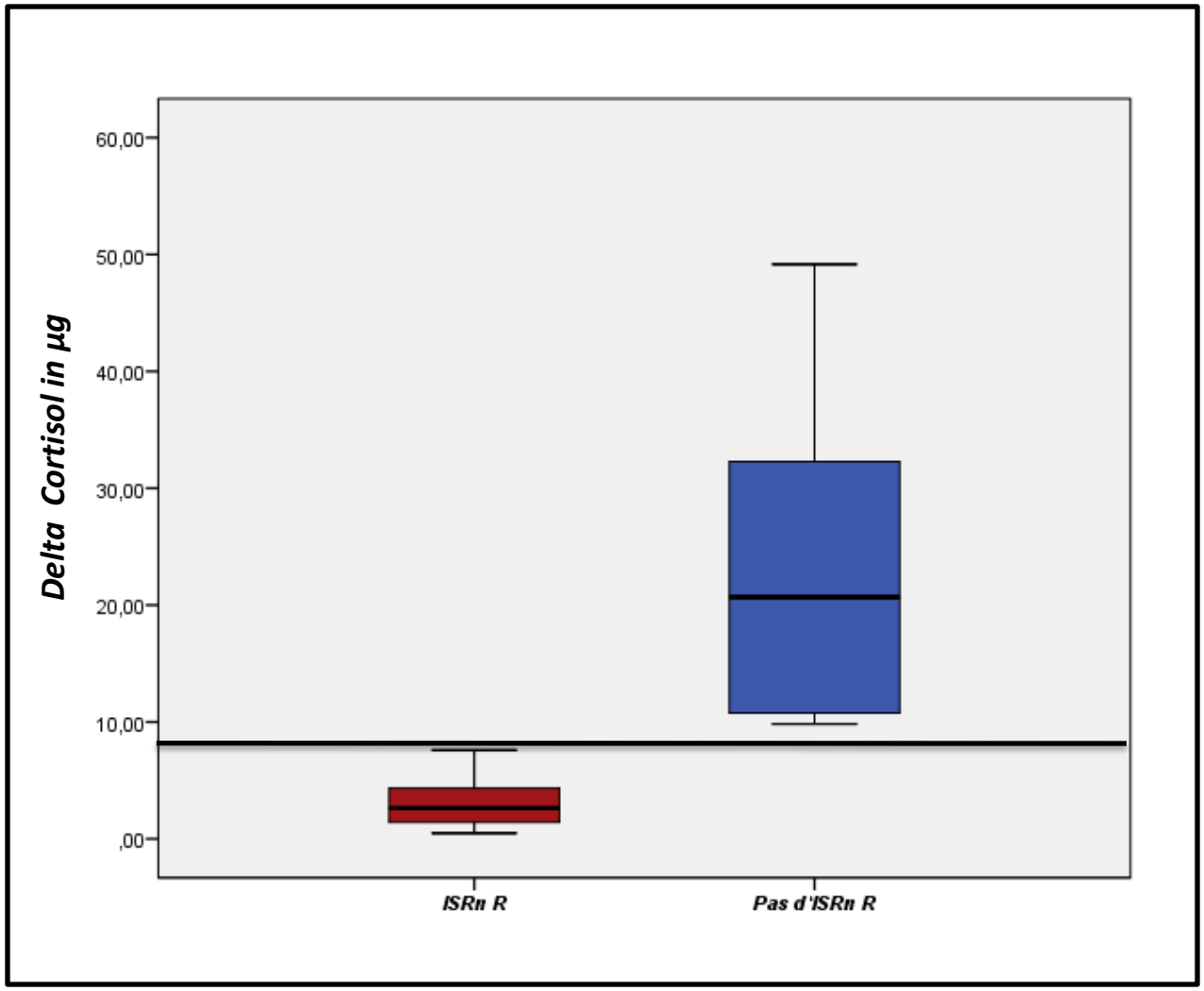
These values are much higher than the normal physiological values ranging between ***5 and 15 µg/dl*** (139 et 416nmol/l)/

→ **reflect a maximum reaction of the HPA axis to burn stress**

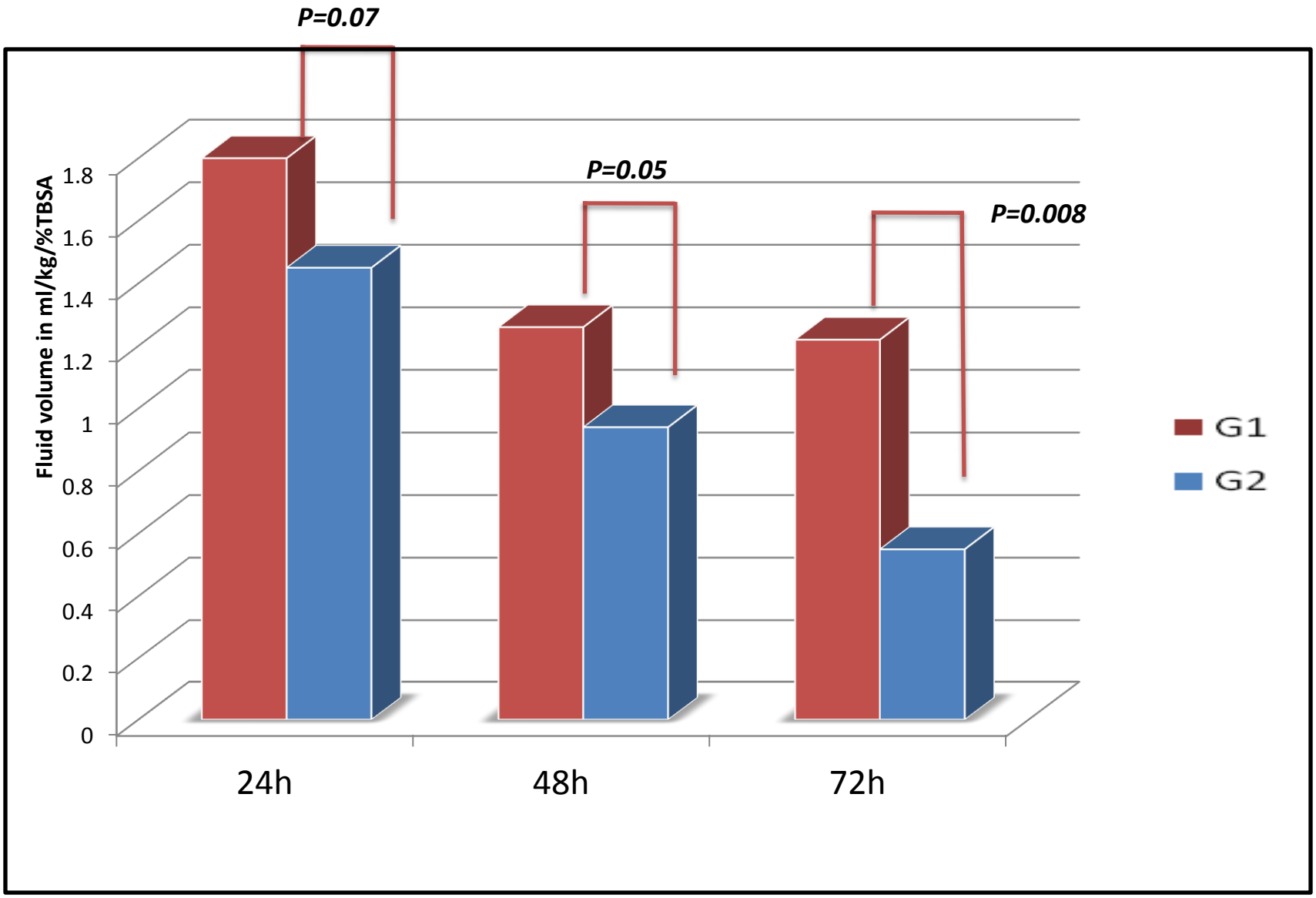


RESULTS

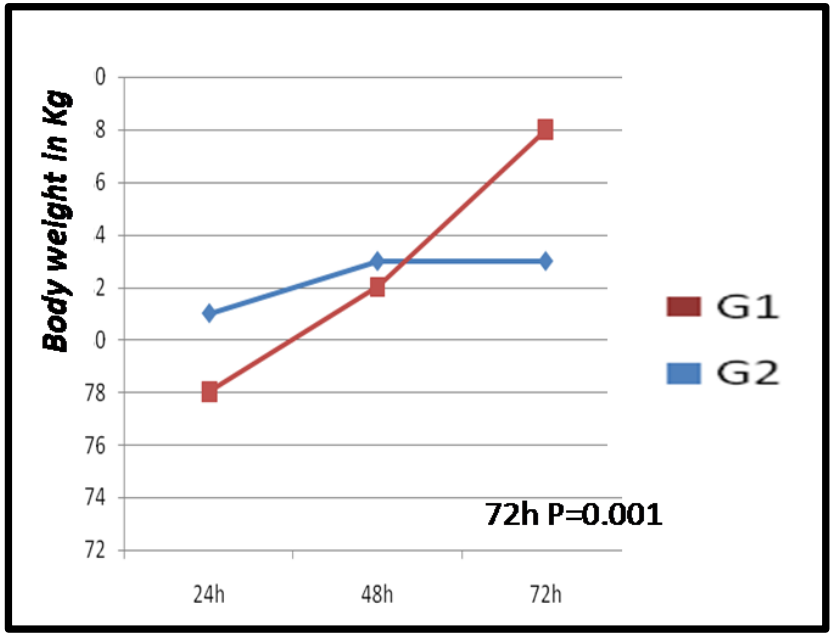
DELTA CORTISOL LEVEL (T60-T0)

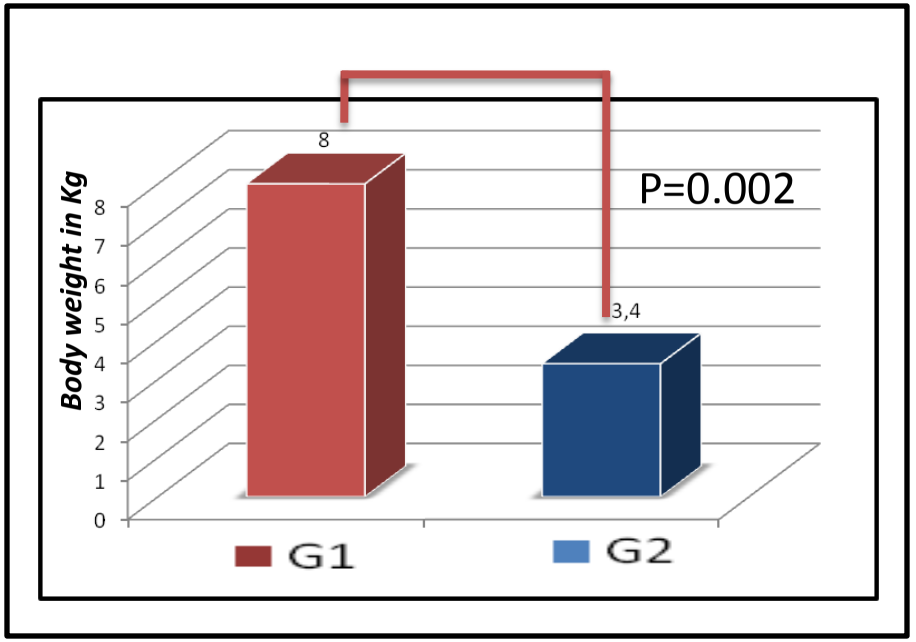


Fluid volume received in (ml/kg/TBSA)



BODY WEIGHT GAIN





Doses of norepinephrine (mg/24h)

The mean Cumulative doses of norepinephrine are higher in G1 comparatively to G2.

	G1 (n=7)	G2 (n=11)	P
24H	**45 ± 54 mg**	**13 ± 12,9 mg**	**0,01**
48H	**38 ± 38 mg**	**7 ± 7,6 mg**	**0,002**
72H	**28 ± 24 mg**	**2 ± 3,7 mg**	**0,004**

CONCLUSIONS

RELATIVE ADRENAL INSUFFICIENCY:

- common in severely burned patients during acute phase (40%)
- associated with greater TBSA and profoundness of injuries
- Leads to greater fluid volume requirement
- Leads to an increase in norepinephrine requirement.
- The benefit of Hydrocortisone in major burn patients needed to be assessed by prospective controlled studies

THANK YOU FOR ATTENTION