RESULTS

This study includes 50 patients suffering from renal stone disease who underwent ESWL using the Dornier Lithotripter U/30.The total number of patients included in this prospective randomized study was 34 males and 16 females. The age of the patients ranged from 21 – 69 years.

Table (2): The comparison between the three studied groups regarding age.

Age	Group A	Group B	Group C
Range	21-65	29-61	28-69
Mean	45.18	44.45	47.7
SD	12.36	10.18	11.2

Group A = Petroleum jelly
Group B = EMLA
Group C = Ultrasound gel

Table (3): The comparison between the three studied groups regarding sex

Sex	Group A		Group B		Group C		Total	
	No.	%	No.	%	No.	%	No.	%
Male	14	63.64	7	63.64	13	76.47	34	68 %
Female	8	36.36	4	36.36	4	23.53	16	32 %
Total	22	44%	11	22%	17	34%	50	100 %

All patients had a solitary stone in one kidney or another. The right kidney was affected in 28 patients (56%) and the left kidney was affected in 22 patients (44%). Table (4) shows the comparison between the three groups with no statistically significant difference.

Table (4): the comparison between the three studied groups regarding side of stone.

Side	Group A		Group B		Group C	
	No.	%	No.	%	No.	%
Rt	11	50.00	6	54.55	11	64.71
Lt	11	50.00	5	45.45	6	35.29

The size of the stone in the three groups ranged from 8 mm to 22 mm. and table (5) shows the comparison between the three groups with no statistically significant difference.

Table (5): the comparison between the three studied groups regarding stone size.

Size	Group A	Group B	Group C
Range	10-22	8-20	8-22
Mean	16.73	14.55	14.5
SD	3.19	3.98	3.7
P	0.098 N.S.		

The site of the stone was in the renal pelvis in 36 patients (72%), in the lower calyx in 7 patients (14%), in the middle calyx in 3 patients (6%), and in the upper calyx in 4 patients (8%) and table (6) shows the

comparison between the three groups with no statistically significant difference.

Table (6): the comparison between the three studied groups regarding solitary renal stone site.

Site	Group A		Group B		Group C	
	No.	**%**	**No.**	**%**	**No.**	**%**
Pelvis	16	72.73	8	72.73	13	76.47
Lower C.	3	13.64	1	9.09	2	11.76
Middle C.	2	9.09	0	0	1	5.88
Upper C.	1	4.55	2	18.18	1	5.88
X^2	3.04					
P	0.099					

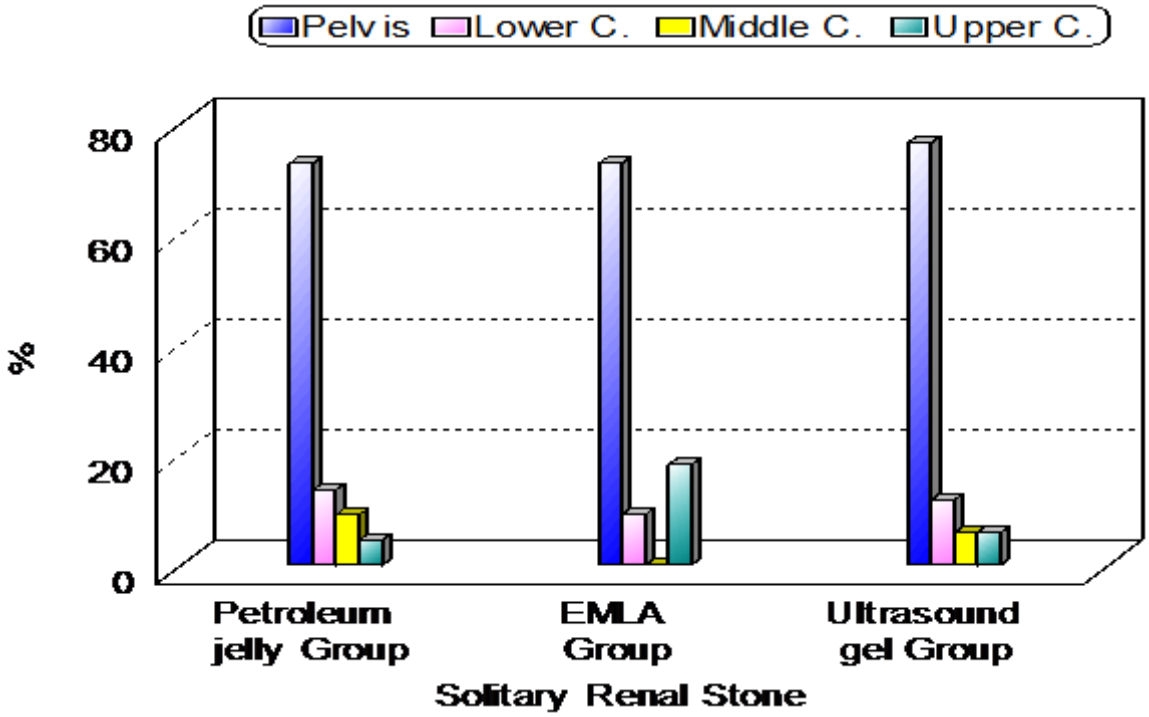

Fig. (9): the comparison between the three studied groups regarding solitary renal stone site.

The state of the kidney on the affected side (as shown by pre ESWL intravenous urography) showed normal pelvicalyceal system in 31 patients (62%), mild hydronephrotic changes in 15 patients (30%), moderate hydronephrotic changes in 4 patients (8%), and no patient had severe hydronephrotic changes. Table (7) shows the comparison between the three groups with no statistically significant difference.

Table (7): the comparison between the three studied groups regarding Hydrohephrosis.

Hydro-hephrosis	Group A		Group B		Group C	
	No.	%	No.	%	No.	%
No	14	63.64	5	45.45	12	70.59
Mild	8	36.36	4	36.36	3	17.65
Moderate	0	0	2	18.18	2	11.76
P	0.072					

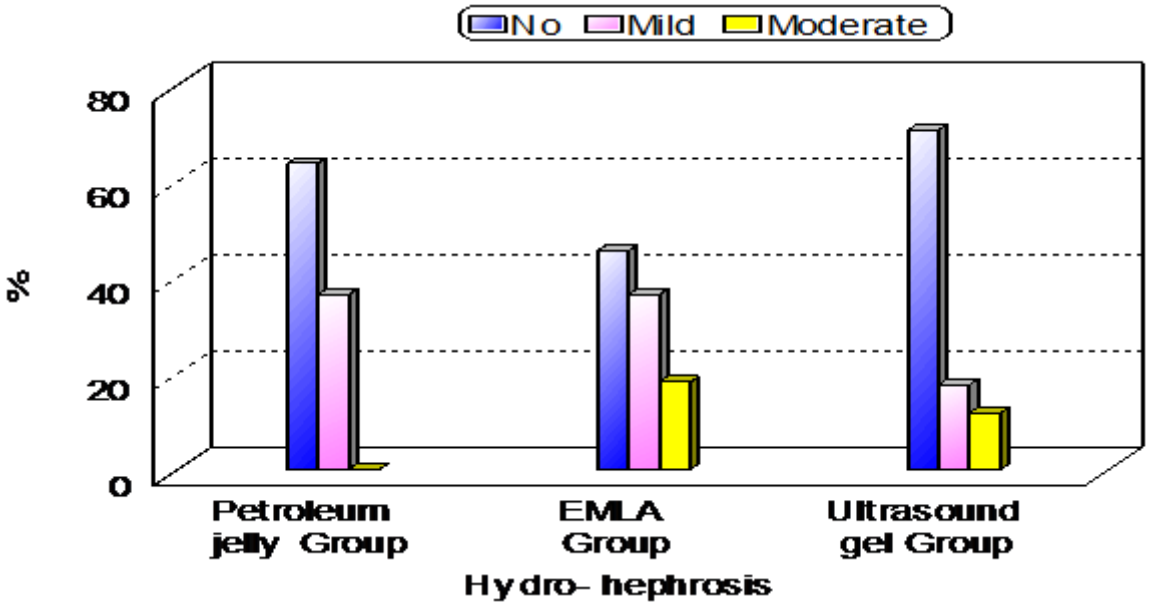

Fig. (10): the comparison between the three studied groups regarding Hydrohephrosis.

The total number of shock waves applied for each patient ranged from 2250 to 12000 shots in group (A), from 2220 to 12000 shots in group (B), and from 2100 to 12000 shots in group (C). Table (8) shows the comparison between the three groups with no statistically significant difference.

Table (8): the comparison between the three studied groups regarding number of shots.

No. of shots	Group A	Group B	Group C
Range	2250-12000	2220-12000	2100-12000
Mean	2900	2400	2300
SD	850	620	470
P	0.106		

The treatment dependant pain was scored using a questionnaire as 1- no pain, 2- minor, 3- tolerable, 4- intolerable pain. ESWL with out additional analgesia had a pain score1-3 while patients had a pain score 4 required additional analgesia.

The pain score in group "A" was 2 in 12 patients (54.55%), 3 in 6 patients (27.27%), 4 in 4 patients (18.18%), and no patients had pain score 1. The pain score in group "B" was 3 in 4 patients (36.36%), and 4 in 7 patients (63.64%), and no patients had either the score of 1 or 2. The pain score in group "C" was 4 in all the patients (100%) as ultrasound gel only was applied as a coupling agent and additional analgesia was required in all the patients. Table (9) shows the comparison between the three groups with statistically significant difference.

Table (9): the comparison between the three studied groups regarding pain score.

Pain score	Group A		Group B		Group C	
	No.	%	No.	%	No.	%
2	12	54.55	0	0	0	0
3	6	27.27	4	36.36	0	0
4	4	18.18	7	63.64	17	100
Mean	2.64		3.36		4	
SD	0.79		0.5		0.0	
X^2	18.65					
P	0.001*					

X^2 = chi- square test

* = significant difference

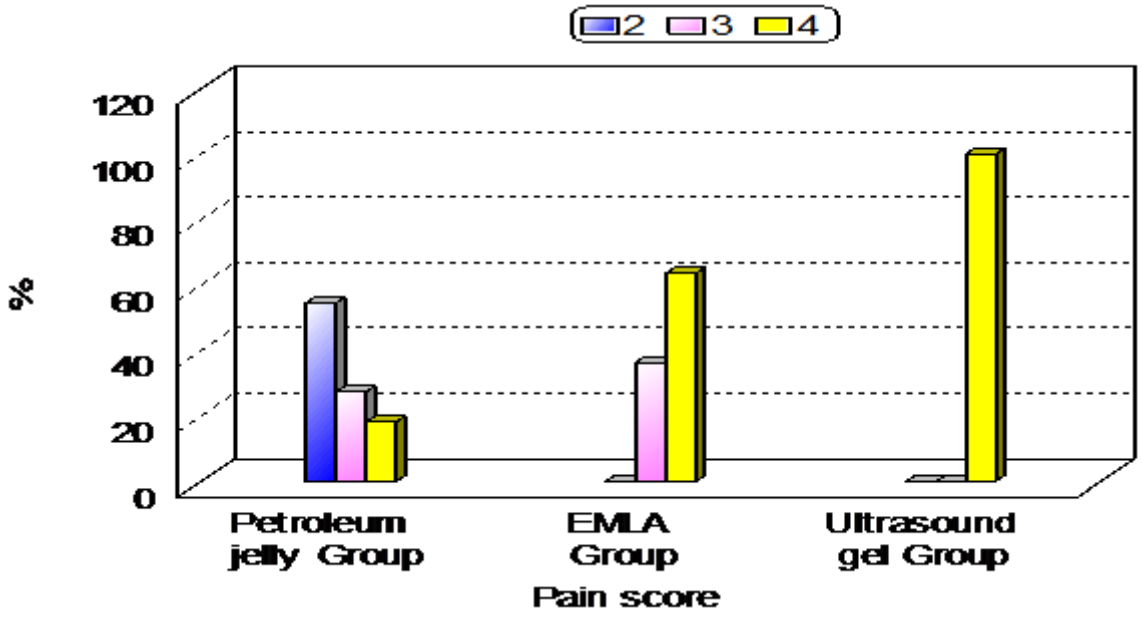

Fig. (11): the comparison between the three studied groups regarding pain score.

In group (A) 18 patients (81.82%) had completed the ESWL treatment without additional analgesics and in group (B) 4 patients

(36.36%) only completed the operation without additional analgesia. But all the patients in group (C) required i.v Nalbuphine and 11 (64.71%) of them received infiltration of Xylocaine 2%. Table (11) shows the comparison between the three groups with statistically significant difference.

Table (10): the comparison between the three studied groups regarding need of anaesthesia.

Need of anaesthesia	Group A		Group B		Group C	
	No.	%	No.	%	No.	%
No	18	81.8	4	36.4	0	0.0
Yes	4	18.2	7	63.4	17	100.0
X^2	21.65					
P	0.0001*					

X^2 = chi- square test

* = significant difference

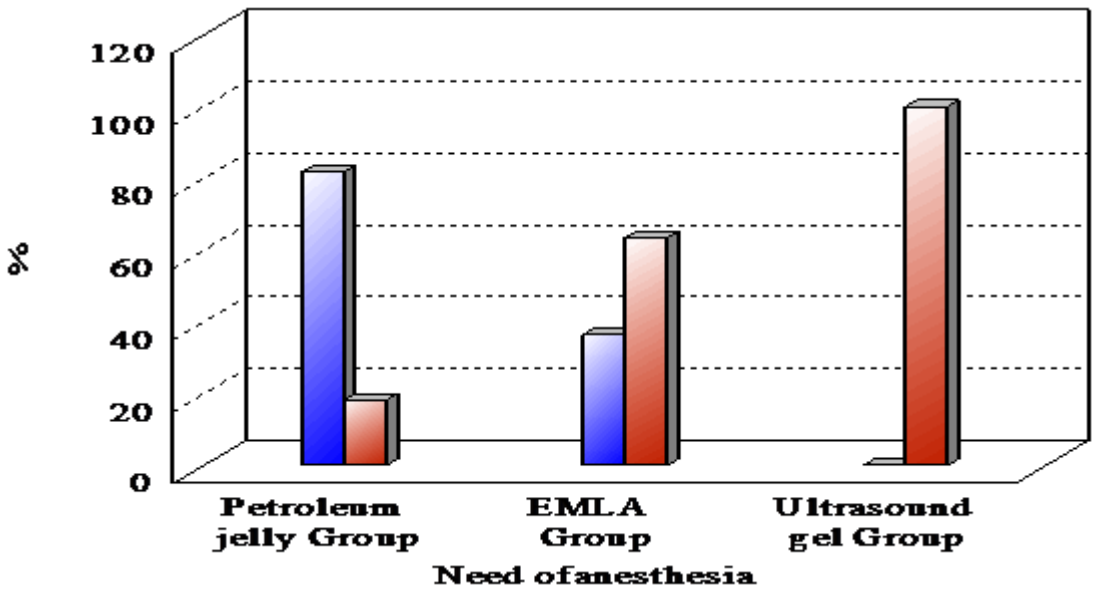

Fig. (12): The comparison between the three studied groups regarding need of anaesthesia.

The three groups were compared as regard the stone free rate at the end of three months from the last ESWL session.

Group (A)*:** 14 patients (63.64%) became stone free, 5 patients (22.73%) had clinically insignificant residual fragments (CIRF) which are particles less than 4 mm in diameter. These patients were considered as success and were treated conservatively together with follow up by KUB films every month. And 3 patients (13.64%) had clinically significant residual fragments (CSRF) which are particles larger than 4mm in diameter and were considered as failure ***(Delevecchio and Preminger, 2000).

***Group (B)*:** 7 patients (63.64%) became stone free, two patients (18.18%) had clinically insignificant residual fragments (CIRF), and two patients (18.18%) had clinically significant residual fragments (CSRF).

***Group (C)*:** 11 patients (64.71%) became stone free, 3 patients (17.65%) had clinically insignificant residual fragments (CIRF), and 3 patients (17.65%) had clinically significant residual fragments (CSRF).Table (11) shows the comparison between the three groups with no statistically significant difference.

Table (11): The comparison between the three studied groups regarding final results three months after the last ESWL session.

Results	Group A		Group B		Group C	
	No.	%	No.	%	No.	%
Stone Free	14	63.64	7	63.64	11	64.71
C.I.R.F.	5	22.73	2	18.18	3	17.65
C.S.R.F.	3	13.64	2	18.18	3	17.65
X^2	1.08					
P	0.77 "N.S"					

X^2 = chi- square test

N.S = insignificant

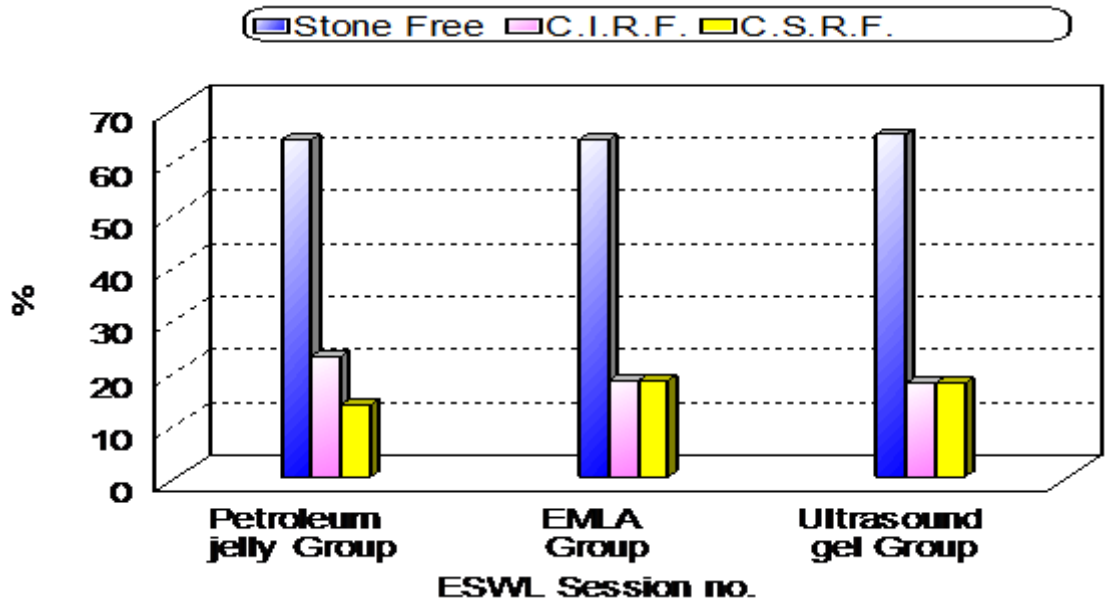

Fig. (13): the comparison between the three studied groups regarding final results.

Pre-ESWL auxiliary procedure included DJ insertion in 6 patients (12%). The stone size in these patients ranged from 20 to 22 mm. Four of them were pelvic stones and two were lower calyceal stones.

The complications encountered during this study include transient mild hematuria in 28 patients (56%) lasted from 24-48 hours post ESWL and resolved conservatively by high fluid intake and diuretics. No patient required hospitalization for control of hematuria.

Renal pain or colic occurred in 23 patients (46%) during passage sage of the fragmented stones. The pain or colic was mild to moderate in intensity and responded to treatment by non steroidal anti-inflammatory drugs together with antispasmodic medications.

Low grade fever (37.5 38 C) occurred in 3 patients (6%) during this study. No evidence of obstruction was detected in any of them. The fever subsided within 48 -72 hours with antibiotics and antipyretics. Nausea and vomiting occurred transiently in 4 patients (8%).

Case One

Fig. (14). (a) KUB of a patient with left renal pelvic stone.

Fig. (14). (b) IVU of the same patient without hydronephrosis.

Fig. (14). (c) KUB of the same patient 3 months after the last ESWL session showing complete stone clearance.

Case Two

Fig. (15). (a) KUB of a patient with right renal pelvic stone.

Fig. (15). (b) IVU of the same patient with minimal hydronephrosis.

Fig. (15). (c) KUB of the same patient 3 months after the last ESWL session showing complete stone clearance.

Case Three

Fig. (16). (a) KUB of a female patient with left renal pelvic stone.

Fig. (16). (b) IVU of the same patient without hydronephrosis.

Fig. (16) . (c) KUB of the same patient 3 months after the last ESWL session showing complete stone clearance.