Results

This study included 30 patients (15 males and 15 females) with different sized keloid (15 patients) and hypertrophic scars (15 patients) ranged from 2-10 cm and of less than 5 years duration. The patients' ages ranged from 10 to 50 years with a mean of 27.66±11.056 and 24.467±10.829 years in groups I and II respectively. The mean duration of lesions in group I was 13.867 ±9.031 months while in group II it was 15.4±14.222 months (Table 8). The etiology of patients' scars in each group was variable. Our patients were of Fitzpatrick skin phototypes II-IV.

Group I included 9 males and 6 females . The patients were injected intralesionally with triamcinolone acetonide.

Group II included 6 males and 9 females. The patients were injected intralesionally with verapamil hydrochloride.

The anatomical locations of lesions in both studied groups were variable included chest, arm, back, knee , shoulder, abdomen and leg (Table 9).

Regarding the improvement of Vancouver scar scale, the results were as follows:

A) Vascularity:

In group I: before treatment 11 patients (73.33%) had red lesions (score 2) and 4 patients (26.67 %) had purple lesions (score 3). After treatment , the vascularity became normal (score 0) in 6 patients (40%) and pink (score 1) in 5 patients (33.33%).

There was a statistically significant improvement in group I (P-value< 0.05%)(Table 10).

In group II: before treatment 12 patients (80%) had red lesions (score 2) and 3 patients (20%) had purple lesions (score 3). After treatment 3 patients (20%) became normal vascularity (score 0) and pink (score 1) in 9 patients (60%).

There was a statistically significant improvement in group II (P-value < 0.05%) (Table 10).

There was no statistically significant difference between the two studied groups (Table 10).

B) Height:

In group I: The height of lesions before treatment was 2-5mm (sore 2) in 14 patients (93.33%) and 5mm (score 3) in 1 patient (6.67%). Flatting of lesions (score 0) occurred in 11 patients (73.33%) while reduction to 2mm (score 1) documented in 3 patients (20%).

There was a statistically significant improvement in height in group I (P-value < 0.05%)(Table 11).

In group II: Before treatment 13 patients (86.67%) had lesions with 2-5mm height (score 2) and 2 patients (13.33%) had lesions with 5mm height (score 3).

After treatment flattening (score 0) occured in 12 patients (80%) and reduction of the lesions to 2mm (score 1) occurred in one patient (6.67%) (Table 11).

There was a statistically significant reduction in height in group II (P-value < 0.05 %) (Table 11).

There was no statistically significant difference between the two studied groups (P-value > 0.05%)(Table 11).

C) Pigmentation:

In group I: Pigmentation before treatment was normal(score 0) in 1 patient (6.67%) , mixed (score 2) in 6 patients (40%) and hyperpigmentation(score 3) in 8 patients (53.33%). After treatment, normal pigmentation (score 0) occurred in 13 patients (86.67%), mixed pigmentation (score 2) in one patient (6.67%) and hyperpigmentation (score 3) in one patient (6.67%) .

There was a statistically significant improvement in pigmentation in group I (P-value < 0.05%)(Table 12).

In group II: The pigmentation before treatment was mixed (score 2) in 7 patients (46.67%) and hyperpigmented (score 3) in 8 patients (53.33%). After treatment 11 patients (73.33%) showed normal pigmentation (score 0) and 4 patients (26.67%) showed mixed pigmentation (score 2) (Table 12).

There was a statistically significant improvement in pigmentation in group II (P-value < 0.05%).

There was no statistically significant difference between the two studied groups (P-value > 0.05%) (Table 12).

D) Pliability:

In group I: Pliability before treatment was yielding (score 2) in 3 patients (20%) and firm (score 3) in 12 patients (80%). After treatment, 13 patients (86.67%) showed normal pliability (score 0) and 2 patients (13.33%) showed supple pliability (score 1)(Table 13).

There was a statistically significant improvement in group I (P-value < 0.05%)(Table 13).

In group II: Pliability before treatment was yielding (score 2) in 4 patients (26.67%) and firm (score 3) in 11 patients (73.33%). After treatment 14 patients (93.33%) showed normal pliability (score 0) and 1 patient (6.78%) showed yielding pliability (score 2) (Table 13).

There was a statistically significant improvement in group II (P-value < 0.05%)(Table 13).

There was no statistically significant difference between the two studied groups (P-value > 0.05%) (Table 13).

Regarding the Vancouver scar scale:

There was statistically significant improvement in Vancouver score in the two groups after treatment (P-value < 0.05%) (Table 14 and Figure 1).

In group I, the Vancouver score before treatment was 9.533±0 .990 and after treatment, it was 1.333±1.113.

Two patients (13.33%) showed good response (Vancouver score changes 51-75%) and thirteen patients (86.67%) showed excellent response (Vancouver score changes more than 75%) (Table 14 and figure 2).

In group II, Vancouver score before treatment was 9.733±1.223 and after treatment it was 1.733±1.944 (Table 14and Figure 1).

One patient (6.67%) showed moderate response (vancouver score changes 25-50%), two patients (13.33%) showed good response (Vancouver score changes 51-75%) and twelve patients (80%) showed excellent response (Vancouver changes more than 75%) (Table 15 and figure 2).

In our study there was a statistically significant negative correlations between Vancouver scale and the age of patients and the duration of lesions (Table 16 and Figures 3,4).

The improvement in Vancouver scale was not affected by the site of lesions (Table 17).

There was a statistically non significant difference in the Vancouver scale regarding the patient's sex in both studied groups (Table 18 and Figure 5).

There was a statistically significant improvement in all skin types, this means that the improvement of lesions was not affected by skin type (Table 19 and Figure 6).

Regarding the number of sessions required:

In the two studied groups, it varied from one patient to the others according to the response of the patients.

In group I : The numbers of intralesional injections of TAC received ranged from 4 to 6 sessions; one patient (6.67%) had 4 sessions, 4 patients (26.67%) had 5 sessions and 10 patients (66.67%) had 6 sessions (Table 20 and Figure 7).

In group II: The numbers of intralesional injections of verapamil received ranged from 5 to 7 sessions; 3 patients (20%) had 5 sessions , 11 patients (73.33%) had 6 sessions and 1 patient (6.66%) had 7 sessions. The difference was statistically non significant ($P>0.05$) compared to group I (Table 20 and Figure 7).

Regarding the side effects:

Telangectasia and hyperpigmentation were documented in 2 patients (13.3%) in group I.

No side effects were reported during treatment in group II.

Pain was a common complaint in all patients although the intensity of pain was differently expressed by patients. Pain was more with TAC injection.

Regarding the cost of treatment:

The cost of TAC injection was relatively lower than verapamil (Table 21).

Table 8 : Age distribution of patients and duration of lesions in the two studied groups.

		Range	Mean ± SD	T-test	
				t	P-value
Age (years)	Group I	10 - 50	27.667 ± 11.056	0.801	0.430
	Group II	10 - 50	24.467 ± 10.829		
Duration (month)	Group I	4 - 36	13.867 ± 9.031	-0.353	0.727
	Group II	4 - 48	15.400 ± 14.222		

Table 9: Locations of lesions in patients of the two studied groups.

Site		Groups		Total
		Group I	Group II	
Chest	N	5	1	6
	%	33.33	6.67	20.00
Arm	N	1	0	1
	%	6.67	0.00	3.33
Back	N	3	5	8
	%	20.00	33.33	26.67
Knee	N	2	1	3
	%	13.33	6.67	10.00
Shoulder	N	1	0	1
	%	6.67	0.00	3.33
Abdomen	N	3	1	4
	%	20.00	6.67	13.33
Upeer aem	N	0	2	2
	%	0.00	13.33	6.67
Forearm	N	0	2	2
	%	0.00	13.33	6.67
Lower abdomen	N	0	1	1
	%	0.00	6.67	3.33
Leg	N	0	2	2
	%	0.00	13.33	6.67
Total	N	15	15	30
	%	100.00	100.00	100.00
Chi-square	X^2	13.500		
	P-value	0.141		

Table 10: Vascularity changes in the two studied groups.

Vascularity		Group I		Group II		Total		Chi-Square	
		N	%	N	%	N	%	X^2	P value
Before treatment	0	0	0	0	0	0	0	0.186	0.666
	1	0	0	0	0	0	0		
	2	11	73.33	12	80	23	76.67		
	3	4	26.67	3	20	7	23.33		
After treatment	0	6	40	3	20	9	30.0	2.200	0.333
	1	9	60	11	73.33	20	66.67		
	2	0	0	1	6.67	1	6.67		
	3	0	0	0	0	0	0		
Chi-Square	X^2	30.000		26.308					
	P value	<0.001*		<0.001*					

* Statistically significant.

There was a statistically significant improvement in vascularity in the two studied groups(P-value<0.05), while the difference between the two groups was statistically non significant(P-value>0.05).

Table 11 : Hieght changes in the two studied groups.

Height		Group I		Group II		Total		Chi-Square test	
		N	%	N	%	N	%	X^2	P value
Before treatment	0	0	0	0	0	0	0	0.370	0.543
	1	0	0	0	0	0	0		
	2	14	93.33	13	86.67	27	90		
	3	1	6.67	2	13.33	3	10		
After treatment	0	11	73.33	13	86.67	24	80.00	2.967	0.227
	1	4	26.67	1	6.67	5	16.67		
	2	0	0	1	6.67	1	3.33		
	3	0	0	0	0	0	0		
Chi-Square	X^2	30.000		26.286					
	P value	<0.001*		<0.001*					

* Statistically significant.

There was a statistically significant improvement in hieght in the two studied groups(P-value<0.05), while the difference between the two groups was statistically non significant(P-value>0.05).

Table 12 : Pigmentation changes in the two studied groups.

Pigmentation		Group I		Group II		Total		Chi-Square test	
		N	%	N	%	N	%	X^2	P value
Before treatment	0	1	6.67	0	0	1	3.33	1.077	0.584
	1	0	0	0	0	0	0		
	2	6	40	7	46.67	13	43.33		
	3	8	53.33	8	53.33	16	53.33		
After treatment	0	13	86.67	11	73.33	24	80.00	2.967	0.227
	1	0	0	0	0	0	0		
	2	1	6.67	4	26.67	5	16.67		
	3	1	6.67	0	0	1	3.33		
Chi-Square	X^2	19.302		19.818					
	P value	<0.001*		<0.001*					

* Statistically significant.

There was a statistically significant improvement in pigmentation in the two studied groups(P-value<0.05), while the difference between the two groups was statistically non significant(P-value>0.05).

Table 13: Pliability changes in the two studied groups.

Pliability		Group I		Group II		Total		Chi-Square test	
		N	%	N	%	N	%	X^2	P value
Before treatment	0	0	0	0	0	0	0	0.186	0.666
	1	0	0	0	0	0	0		
	2	3	20	4	26.67	7	23.33		
	3	12	80.0	11	73.33	23	76.67		
	4	0	0	0	0	0	0		
	5	0	0	0	0	0	0		
After treatment	0	13	86.67	14	93.33	27	90	3.037	0.219
	1	2	13.33	0	0	2	6.67		
	2	0	0	1	6.67	1	3.33		
	3	0	0	0	0	0	0		
	4	0	0	0	0	0	0		
	5	0	0	0	0	0	0		
Chi-Square	X^2	30.000		26.800					
	P value	<0.001*		<0.001*					

* Statistically significant.

There was a statistically significant improvement in pliability in the two studied groups(P-value<0.05), while the difference between the two groups was statistically non significant(P-value>0.05)**.**

Table 14 : Vancouver Scale changes in the two studied groups.

	Total result		% of improvement	Paired T-test	
	before	after			
	Mean ± SD	Mean ± SD		t	P-value
Group I	9.533 ± 0.990	1.333 ± 1.113	86	27.702	0.000*
Group II	9.733 ± 1.223	1.733 ± 1.944	82	21.166	0.000*

* Statistically significant.

There was a significant reduction in the Vancouver scale score in both studied groups (p-value <0.05%)

Figure 1 : Vancouver Scar Scale changes in the studied groups.

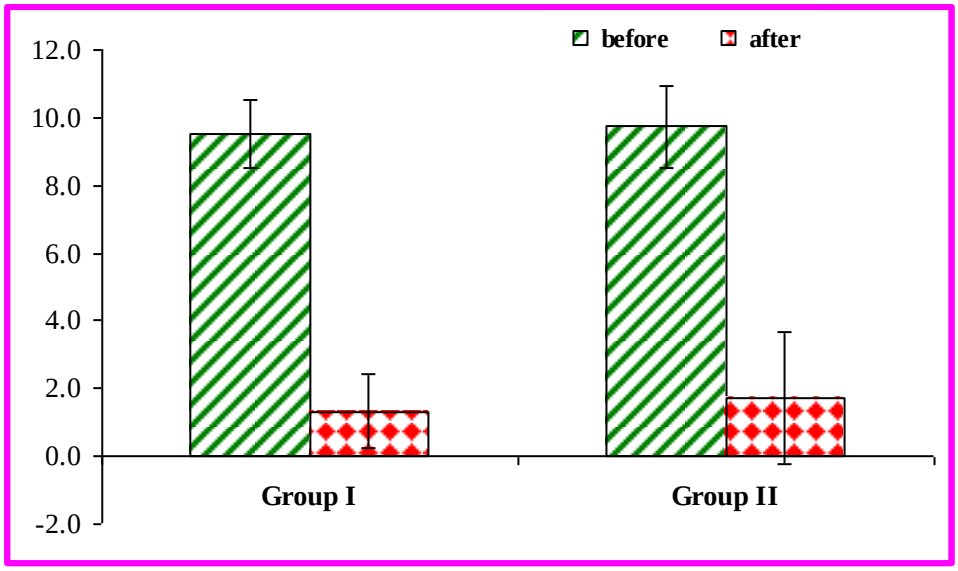

Table 15 : Improvement in the Vancouver score in both studied groups.

Group		Moderate 25-50%	Good 51-75%	Excellent >75%	Total
Group I	N	0	2	13	15
	%	0.00	13.33	86.67	100.00
Group II	N	1	2	12	15
	%	6.67	13.33	80.00	100.00
Total	N	1	4	25	30
	%	3.33	13.33	83.33	100.00
Chi-square	X^2	1.040			
	P-value	0.595			

Figure 2: Improvement in the Vancouver score in the two studied groups.

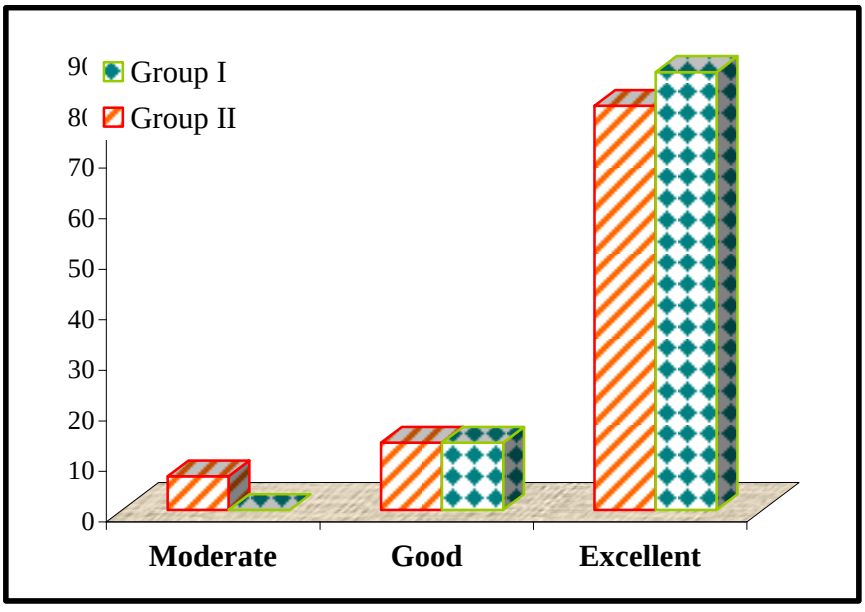

Table 16 : Correlations between the changes in the Vancouver scale with age of patients, duration of lesion and skin type.

	r	P-value
Age	-0.486	0.006*
Duration	-0.481	0.007*
Skintype	-0.220	0.243

* Statistically significant.

There was a statistically significant negative correlation between both age of patient and duration of lesion with the Vancouver scale (P-value < 0.05%).

Figure 3: Correlations between the changes in Vancouver scale and the age of patients.

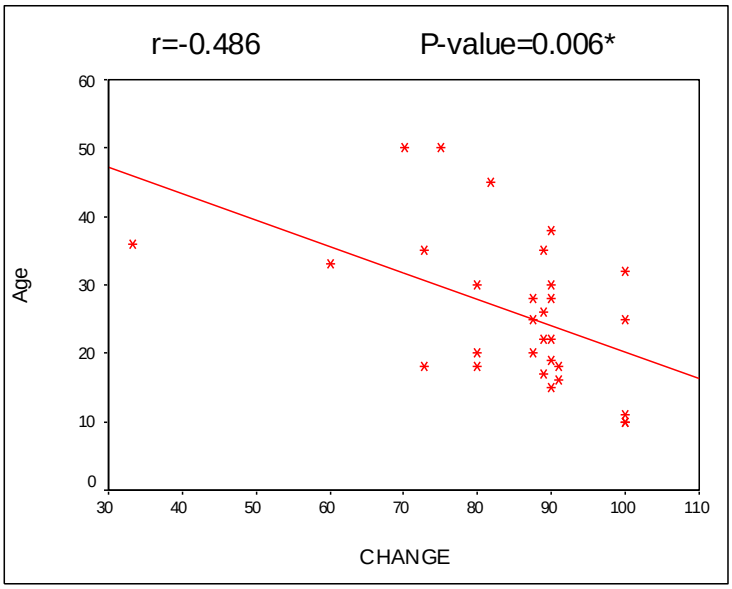

Figure 4 : Correlation between the changes in Vancouver scale and the duration of lesions.

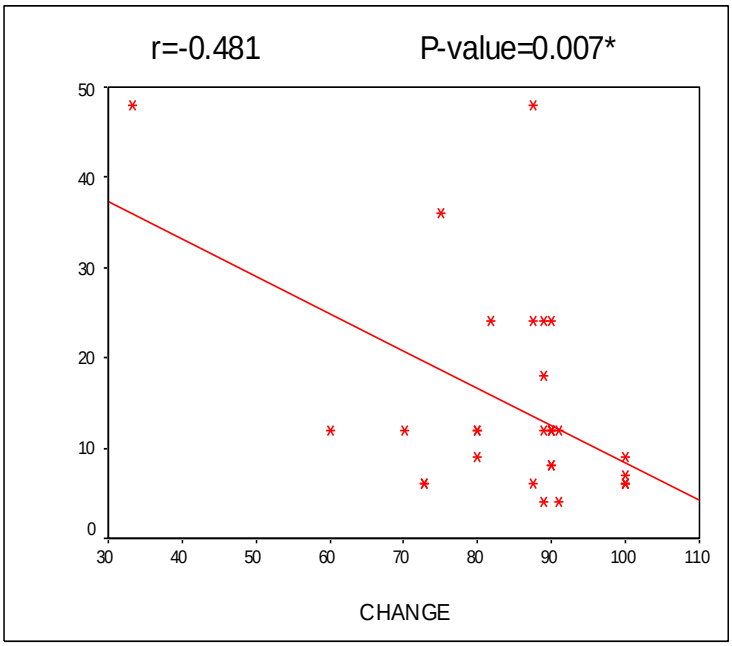

Table 17 : Correlations between the improvement in Vancouver scale and locations of lesions.

Group	Site	Moderate 25-50%		Good 51-75%		Excellent >75%		Total		Chi-square	
		N	%	N	%	N	%	N	%	X^2	P-value
Group I	Chest	0	0.00	1	50.00	4	30.77	5	33.33	8.077	0.152
	Arm	0	0.00	0	0.00	1	7.69	1	6.67		
	Back	0	0.00	0	0.00	3	23.08	3	20.00		
	Knee	0	0.00	0	0.00	2	15.38	2	13.33		
	Shoulder	0	0.00	1	50.00	0	0.00	1	6.67		
	Abdomen	0	0.00	0	0.00	3	23.08	3	20.00		
	Total	0	0.00	2	100.00	13	100.00	15	100.00		
Group II	Chest	0	0.00	0	0.00	1	8.33	1	6.67	17.000	0.256
	Back	1	100.00	0	0.00	4	33.33	5	33.33		
	Knee	0	0.00	0	0.00	1	8.33	1	6.67		
	Abdomen	0	0.00	0	0.00	1	8.33	1	6.67		
	Upeer aem	0	0.00	0	0.00	2	16.67	2	13.33		
	Forearm	0	0.00	0	0.00	2	16.67	2	13.33		
	Lower abdomen	0	0.00	0	0.00	1	8.33	1	6.67		
	Leg	0	0.00	2	100.00	0	0.00	2	13.33		
	Total	1	100.00	2	100.00	12	100.00	15	100.00		

The improvement in Vancouver scale was statistically non significant in relation to sites of lesions.

Table 18 : Improvement of lesions in both studied groups and their relation with the sex of patients.

Group	Sex	Total result		Paired -test	
		Before	After		
		Mean ± SD	Mean ± SD	t	P-value
Group I	Male	9.222 ± 0.833	1.444 ± 1.130	19.415	<0.001*
	Female	10.000 ± 1.095	1.167 ± 1.169	28.743	<0.001*
Group II	Male	9.833 ± 1.169	1.333 ± 1.033	17.000	<0.001*
	Female	9.667 ± 1.323	2.000 ± 2.398	14.546	<0.001*

* Statistically significant.

There was a statistically significant improvement in Vancouver scale regardless patient,s sex.

Figure 5 : Vancouver score changes and their relations to the sex of patients.

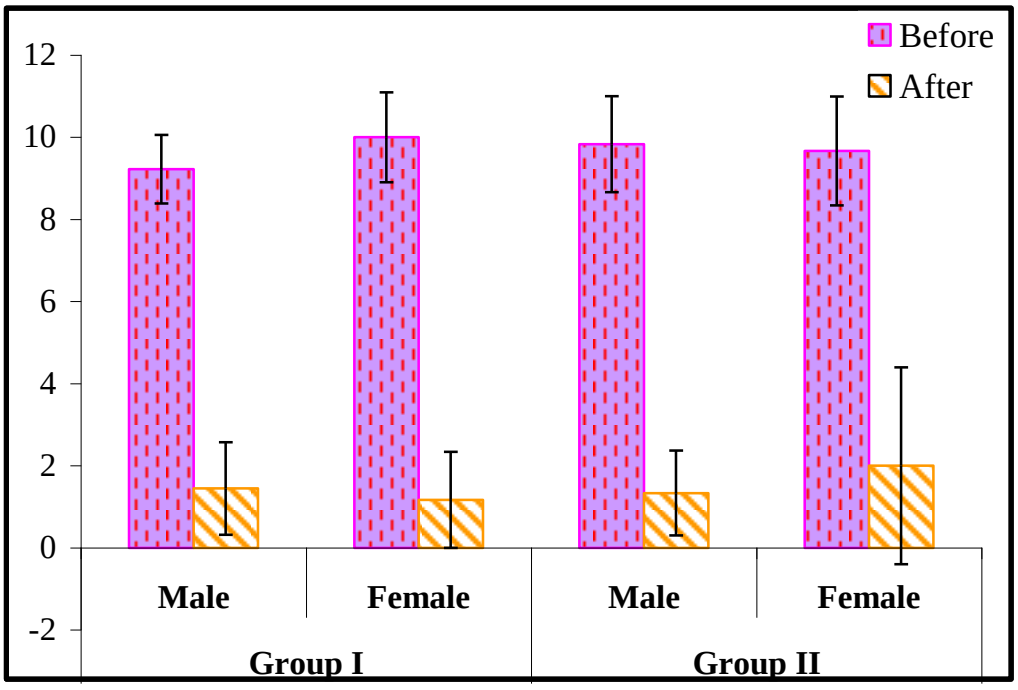

Table 19 : Vancouver scale changes in both studied groups and their relation with the skin type of patients.

Group	Skin type	Total result		Paired -test	
		Before	After		
		Mean ± SD	Mean ± SD	t	P-value
Group I	II	9.333 ± 1.155	1.333 ± 0.577	13.856	0.005*
	III	9.444 ± 1.014	1.333 ± 1.414	17.837	<0.001*
	IV	10.000 ± 1.000	1.333 ± 0.577	26.000	<0.001*
Group II	II	9.600 ± 1.342	0.800 ± 0.447	15.092	<0.001*
	III	9.625 ± 1.302	2.000 ± 2.507	13.496	<0.001*
	IV	10.500 ± 0.707	3.000 ± 0.000	15.000	0.042*

* Statistically significant.

There was a statistically significant improvement in Vancouver scale regardless patient,s skin type.

Figure 6: Vancouver scale changes in both studied groups and their relation with the skin type of patients.

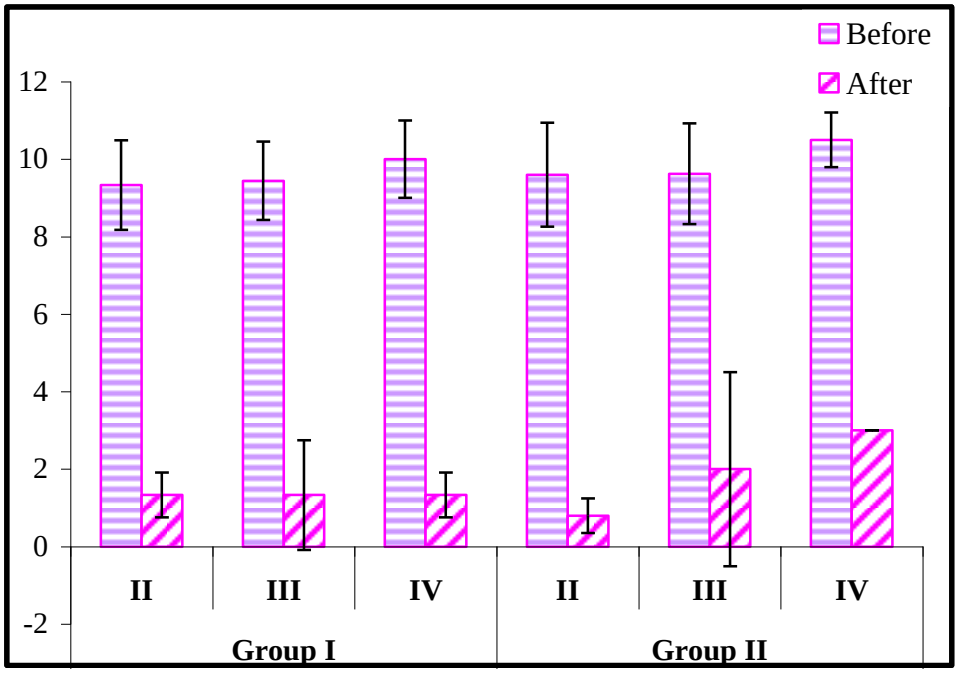

Table 20 : The number of sessions required for patient groups.

No. of sessions		Group					
		Group I		Group II		Total	
		N	%	N	%	N	%
4		1	6.67	0	0.00	1	3.33
5		4	26.67	3	20	7	23.33
6		10	66.67	11	73.33	21	70.00
7		0	0.00	1	6.66	1	3.33
Total		15	100.00	15	100.00	30	100.00
Chi-square	X^2	2.331					
	P-value	0.592					

There was a statistically non significant difference between the two studied groups regarding the number of sessions.

Figure 7 : The number of sessions required for patient groups.

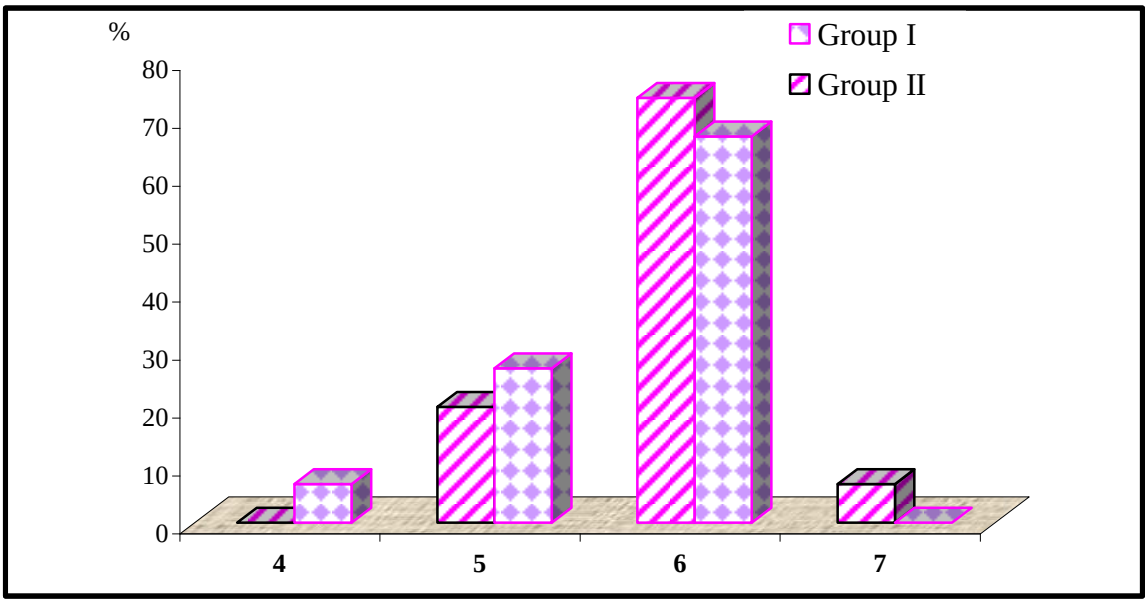

Table 21 : Comparison between TAC and Verapamil cost in treatment of keloids and hypertrophic scars according to the number of sessions.

	TAC	**Verapamil**
Dose per one cm^2 per session	0.5 ml/cm^2	0.5 mL/cm^2
Cost of dose per one cm^2 per session	1.4 Egyptian pounds	2.25 Egyptian pounds
Maximum dose per session	5 ml	5 ml
Cost of Maximum dose per session	14 Egyptian pounds	22.5 Egyptian pounds

The cost of TAC injection was lower than verapamil, however the side effects were more with TAC injection.