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Using Pressure Garment versus Hospital Routine Care on Reducing Scars Immediately after Burn Surgery

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Abstract **Background**: Abnormal scar advancement resulting from burn injury in children has basic impact on adolescents' children physical and mental working as well as health- related costs for both family and the health care benefit. **The study aims:** to evaluate using of pressure garment versus hospital routine care on reducing scars immediately after burn surgery. **Research design:** quasi-experimental research design was utilized within the current study. **Subjects:** purposive sample including (40) male and female adolescents' children and early adult hood were included within the current study and divided into two groups study (20) and control (20). **Setting:** the study was carried out at Minia General Hospital in burn inpatient department. **Tool of data collection:** one tool was used to gather information has divided into two parts: **First part:** developed by researchers to assess adolescent children and early adulthood biosociodemographic characteristic as (age, sex…. ect.). **Second part:** The Patient and Observer Scar Assessment Scale (POSAS) scare assessment scale consists of 2 subscales: (the patient and observer scar assessment scale). **Results:** observable decreasing of burn scars among study group after applying pressure garment immediately post burn surgery during follow up (within 3, 6 and 9 months). **Conclusion:** utilizing of pressure garment was an effective method in reducing burn scar among adolescents' children and early adulthood immediately after burn surgery. **Recommendations:** training programs for nurses in burn units overhauled with the evidence-based practices and recent strategies for decreasing burn scar which has huge results on adolescents' children physically and mentally.

Keywords: *pressure garment, burn surgery, scars*

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1. Introduction

Burn scars impact the quality of life due to a cluster of utilitarian, corrective and mental issues, related to scarring [1]. There are numerous accessible rebellious that have been tried and approved to assess scar quality. Scar appraisal scales are frequently utilized since they are effectively available and free of charge [2,3]. Variables related with scarring hazard in children incorporate total body surface area (TBSA) burned, deep burn injuries, postponed wound healing, anatomical burn location, skin grafting and skin type [4,5] Burn extraction and grafting are prescribed for all full-thickness burns and for profound partial-thickness burns that would show up to require more than 2-3 weeks to heal. Any condition that would commonly block the patient with burn injuries from having general anesthesia may be a contraindication; otherwise, no contraindications to surgery are noted [6]. The skin appearance and the affect of scars must be considered from the patient's viewpoint, not fair the point of view of the treating clinical team [3,7].

Hypertrophic scarring can be considered a systemic inflammatory illness controlled by nearby wound mending components. It occurs more habitually in adult patients and more youthful age groups. Hypertrophic burn scars stay a tricky challenge for both patients and wellbeing care providers and are a really visit issue of burn survivors who have postponed healing or skin-grafted areas. In numerous cases, they are a source of morbidity displaying with lifestyle-limiting issues such as pruritus, pain, burning, stiffness and indeed contractures and can extremely constrain a burn survivor's level of function, including work and recreational activities [8]. Major chance components of pathologic scarring incorporate sex, age, anatomical burn location, number of operations, and skin grafts. In spite of the fact that hypertrophic scarring commonly happens following burns and gives rise to the foremost striking scars experienced in practice, numerous perspectives such as its rate and ideal avoidance and/or treatment stay hazy [9].

Customarily, treatment of hypertrophic burn scars comprises among a few choices of pressure treatment that includes wearing garments made from elasticized fabrics. Mechanical stacking by applying pressures of between 6

and 50 mmHg is routinely utilized to treat, control or avoid a number of therapeutic and pathologic conditions. Ever since that time, among all shapes of noninvasive preservationist administration modalities, pressure treatment by implies of wearing custom-made or commercially accessible pressure garments advanced to gotten to be one of the most noninvasive scar management alternatives. It is broadly utilized around the world and is well substantiated within the writing [10,11].

avoidance or scar itch decrease are started to diminish scar and keep up fast mediation, thickness, erythema and pliability with the extreme objective of keeping up or moving forward by and large appearance of the scar and quality of life [12]. A meta-analysis of studies of pressure garment treatment viability, a later precise survey of noninvasive scar intercessions as pressure garments and a longitudinal study of scarring in individuals with burns getting standard scar administration, have bolstered the significance of measuring scar thickness. Scar thickness has been found to be the characteristic that most clearly recognizes typical scar and typical skin from hypertrophic scars up to 12 months post burn [13,14].

Around 80% of patients after burn injury endure from itching post release and has been detailed to continue for a drawn out period post burn. This symptom encompasses a supported weakening effect on patients, impacting wound mending, mental prosperity and engagement in activities of day by day living [15,16]. Pressure garment treatment moreover works to normalize cellular forms; be that as it may, it does this through mechanical pressure. Pressures of 6 to 50 mmHg are hypothesized to diminish capillary stream. [12] past studies have centered exclusively on the adequacy of scar management intercessions in connection to physical scar characteristics such as itch, height, pain [17,18].

Pressure garments are the foremost successful and comfortable treatment for hypertrophic burn scars. To be compelling, pressure garments treatment ought to be kept up for at slightest 6 to 12 months. Patients are teaching to wear pressure garments 23 hours each day and superior comes about are watched on the off chance that pressure garments treatment is started prophylactically as early as 2 weeks taking after wound closure. Clearly, pressure garments conveyed amid this sort of treatment determines efficacy and complications which will be due to abundance pressure or erroneous pressure garments application [19]. The pressure garment progress general body “homeostasis and burn homeostasis. The study review analysing the accessible information around pressure garments treatment of burn homeostasis in arrange to conceivably build up evidence-based rules for this management methodology that would adjust benefits with costs and conceivable complications [20,21].

It is vital that the anticipation and administration of burn scars is ideal to diminish the effect of scar sequelae, such as itch, on psychosocial advancement and health-related quality of life counting the child’s capacity to autonomously total day by day exercises; and to avoid future obtrusive scar intercessions [11]. The pressure garment treatment prescribed wearing time, 23 hour per day until scar development and the require for standard substitution of garments [18].

1.1. Significant of the Study

A burn is an injury to the skin or other natural tissue basically caused by heat or due to radiation, radioactivity, electricity, contact or contact with chemicals. An estimated 180 000 deaths every year are caused by burns - the endless larger part happen in low- and middle-income countries [22].

Anomalous scars have a recorded predominance rate of 32 to 72% post burn and are characterized as scars with physical and tactile side effects that effect on health-related quality of life due to itch, raising, torment, snugness and contracture arrangement [11].

In children, scarring has considerable repercussions for the child’s physical and mental working [11,23]. So the current study was exceptionally imperative and beneficial in terms of quality of care and life for participants to lessening their post burn scars and mainting as conceivable physically and psychosocially functioning.

1.2. The Aim of the Study

The aim of this study to evaluate the using of pressure garment versus hospital routine care on reducing scars immediately after burn surgery.

1.3. Research Design

Quasi-experimental research design.

2. Subjects & methods

2.1. Setting

This study was done at Minia General Hospital in burn inpatient department which affiliated to Ministry of Health Egypt.

2.2. Sample

Purposive sample, including: (40 males and females adolescents' children and early adulthood groups similarly separated into two groups study (20) and control (20).

2.3. Inclusion Criteria

The consideration criteria are adolescents children and early adulthood with a burn injury who are overseen within the acute stage post burn or who get burn scar reconstructive surgery and children who get skin grafting; children with wounds that have not healed by day 17 post burn; adolescents children and early adulthood have scar in upper and lower extremities at Minia General Hospital who are accompanied by a parent, who is able to provide informed consent Children able to communicate will be enlisted within the study.

2.4. Exclusion criteria

Adolescents' children and early adulthood with comorbidities disarranges that might impact the results

(such as a dermatological disorder). Adolescents' children and early adulthood who have repetitive of skin joining operation.

Tools of data collection: one tool was used to collect data has two parts:

Part I: Adolescents' children and early adulthood biosociodemographic characteristic: (Personal data: as adolescence and early adulthood sex, age, address, education level).

Part II: The Patient and Observer Scar Assessment Scale (POSAS) was adopted from **Van der Wal, et al., [24]; Simons, et al., [25]** were introduced, which aimed at measuring the quality of scar tissue. The Patient and Observer Scar Assessment Scale (POSAS) were consists of 2 subscales: The Patient Scale (PS) and the Observer Scale (OS). The first subscale the Observer Scar Assessment Scale includes six items: thickness, surface area, pigmentation, vascularization, pliability and relief. the researchers were modified the second subscale the Patient Scar Assessment Scale through not assess the thickness, rehief, pliability and color because it was assessed in observer first subscale items and the researchers were assess the pain and pruritus items only. All items were evaluated on numerical rating scales ranging from 1 to 10 no. (1) indicating normal skin but no. (10) indicating the worst imaginable scar or sensation). All items are summed to give a total scar score and therefore, a higher score represents a poorer scar quality and a lower score represents a normal skin. Scare thickness was evaluated by ultrasonography. The Patient and Observer Scar Assessment Scale (POSAS) was evaluated after 3, 6 and 9 months. The researchers were fulfilled of all items of the (POSAS) scale.

In observer component, all parameters consisted of additional category: vascularity: (pale, pink, red, purple or mix); pigmentation: (hypopigmentaion, hyperpigmentaion or mix); thickness: (thicker or thinner); relief: (more, less or mix); pliability: (supple, stiff or mix); surface area: (expansion, contraction or mix) [25,26].

Concurring to the author the definitions of this scale items utilized within the patient and observer scar assessment scale. Vascularity: Nearness of vessels in scar tissue evaluated by the amount of redness, tried by the amount of blood return after whitening with a slide glass. Pigmentation: Brownish coloration of the scar by pigment (melanin); apply slide glass to the skin with moderate pressure to dispense with the impact of vascularity. Thickness: normal remove between the subcutical-dermal border and the epidermal surface of the scar. Relief: the degree to which surface abnormalities are show. Pliability: suppleness of the scar tried by wrinkling the scar between the thumb and index finger. Surface area: surface area of the scar in connection to the first wound area [24].

2.5. Validity and Reliability

The tool was tested the content validity by a jury of three specialists within the field of the study to test the content validity of tool and vital adjustments were done. Reliability of the tool was performed to affirm its consistency utilizing Cronbach's alpha coefficient strategy.

2.6. Pilot Study

A pilot considers on (10 %) 4 adolescents' children and early adulthood was conducted at Minia General Hospital. A pilot study was conducted to test clarity & completeness of the study tools and to decide the time required to fill each instrument. Concurring to the results of pilot, the required adjustment, exclusions and/or increments were done. A jury acceptance of the ultimate forms was secured some time recently genuine study work and the reliability was assessed in a pilot study by measuring their inner consistency utilizing Cronbach's alpha coefficient strategy.

2.7. Ethical Consideration

The verbal assent was gotten from all adolescents' children and early adulthood and their parents ought to participate within the study and the nature and reason of the consider were clarified to them, The researchers at first presented themselves to all discretionary subjects and they were guaranteed that the collected information would be absolutely secret, and namelessness was guaranteed and They were informed that interest is intentional which they might withdraw at any time of the study.

2.8. Procedures

Participants were received routine care for the acute burn injury as determined by the burns multidisciplinary team in Minia General Hospital in burned inpatient department, were provided for control groups for (adolescents' children and early adult hood) as the following (vital signs, I.V. fluids, dressing of skin grafts, tetanus prophylaxis, analgesia and antibiotic medication) while, the routine care and using pressure garment for study groups were provided to study group after burn graft. After take consent from participate in the current study, the baseline assessment was completed. Data collection was taken approximately 20 min at baseline, every 3, 6 and 9 months after using of pressure garment during follow up in inpatient burn department by using. The Patient and Observer Scar Assessment Scale (POSAS) were consists of 2 subscales: The Patient Scale (PS) and the Observer Scale (OS). The first subscale the Observer Scar Assessment Scale include six items: thickness, surface area, pigmentation, vascularization, pliability and relief. The researchers were modified the second subscale the Patient Scar Assessment Scale through not assess the thickness, rehief, pliability and color because it was assessed in observer first subscale items and the researchers were assess the pain and pruritus items only. All items were evaluated on numerical rating scales ranging from 1 to 10 no. (1) indicating normal skin but no. (10) indicating the worst imaginable scar or sensation). All items are summed to give a total scar score and therefore, a higher score represents a poorer scar quality and a lower score represents a normal skin. Scare thickness was evaluated by ultrasonography. The Patient and Observer Scar Assessment Scale (POSAS) were evaluated after 3, 6 and 9 months. The researchers were fulfilled of all items of the (POSAS) scale. To be sure the patient's compliance with pressure garment application the researchers were called participants telephony every 2

weeks at inpatient burn department during follow up period post discharge. Pressure garment was offered free without payment for study groups to be reusable after washing and cleaning for 23 hours per day during study duration.

2.9. Limitation of the Study

1. Cost of the pressure garment therapy is high, and the hospital didn't give any support or facilities to apply this study.
2. Noncooperation from physicians and the nurses in the beginning of the study although there was an explanation about purpose of the study was done from the researcher.

2.10. Statistical Analysis of Data

Data were summarized, tabulated and presented using descriptive statistics in the form of frequency distribution, percentages, means and the standard deviations. A statistical package for the social science (SPSS), version (20) was used for statistical analysis of the data, as it contains the test of significance given in standard statistical books. Qualitative data were expressed as frequency and percentage; qualitative studied variables were compared using Chi-square test. Correlation coefficient was done by using Pearson correlation test. Statistical significance used at P. value <0.05.

3. Result

Table 1 & Figure 1 shows the percentage of the distribution of the study and control groups as regards socio demographic characteristics, it shows that, the mean average age among the study group was 18.7 ± 3.1 years. Equal sample of male and female in study group while 60% from female and 40% male among the control group. As regard to level of education among both the study and control group 50% were Secondary School and Diploma. (65%, 60%); respectively were not worked in study and control groups. Most of the study sample in the study and the control groups were lived in rural area constituted (85% & 95%); respectively. Related to the site of burn (75%, 65%); respectively of adolescents' children has upper extremities burn scar in study groups and control group.

Table 1. Socio demographic characteristics of the study & the control groups (n= 40)

Socio demographic data	Groups			
	Study (n=20)		Control (n=20)	
	N	%	N	%
Age / years				
• Early adolescents' (10:13 years)	8	40	8	40
• Middle adolescents' (14:16years)	2	10	4	20
• Late adolescents' (17:19 years)	5	25	4	20
• Early adult hood (19:21years)	5	25	4	20
Mean ± SD	18.7 ± 3.1		17.7 ± 3.1	
Gender				
• Male	10	50	8	40
• Female	10	50	12	60
Level of education				
• Illiterate	0	0	2	10
• Read and write	9	45	8	40
• Secondary school and diploma	10	50	10	50
• University student	1	5	0	0
Employment status				
• Work	3	15	6	30
• Not work	13	65	12	60
• House wife	4	20	2	10
Residence				
• Rural	17	85	19	95
• Urban	3	15	1	5
Location of burn scar				
• Upper extremities	15	75	13	65
• Lower extremities	5	25	7	35

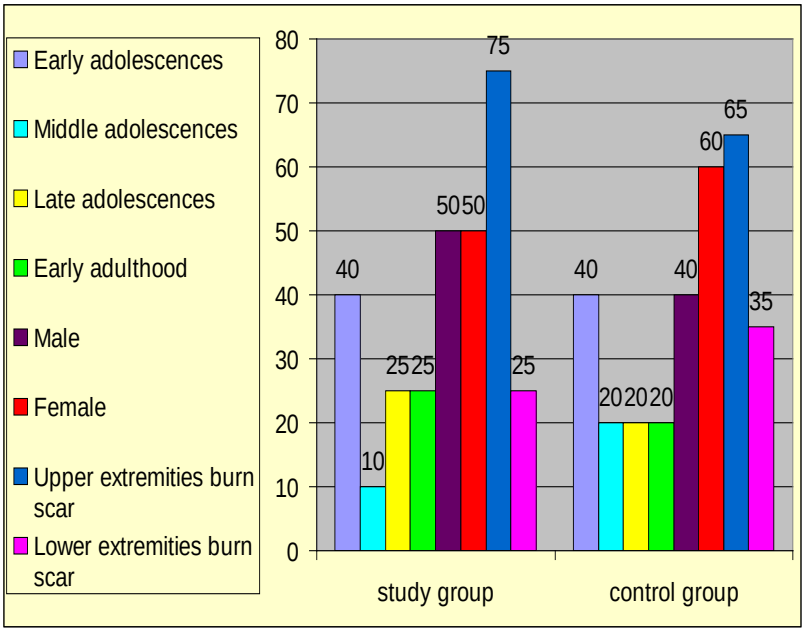

Figure 1. Socio demographic characteristics of the study & the control groups (n= 40)

Table 2 presents comparison between study and control groups regard Observer sub-Scale (OS) during follow up phases (after three, six and nine months) after their pressure garment application. There was observable highest percentage in normal skin ranks in all scale items except one item (thickness) through follow up phases (three, six and nine months) (50%, 75%, 80%); respectively among study group when applying pressure garment. While reverse results occur among control group.

Table 3 & Figure 2 Results revealed that nearly similar percentages where founded among normal skin ranks for study group regard PS. scale (pain, pruritus) during their observation in follow up phases (after three, six and nine months) after they applying of pressure garment.

Table 4 & Figure 3, and Figure 4 illustrates that, the relation between the socio demographic data for the study and control groups and results of total mean of POSAS scar assessment scale during follow up phases.

There were statistically significant relations between the socio demographic data for study and control groups and results regards POSAS scar assessment scale items.

Table 2. Comparison between study and control groups regard the Observer sub-Scale (OS) during follow up phases (after three, six and nine months) after their pressure garment application n=40

Items	Study groups (n=20) N (%)		Control groups (n=20) N (%)		T. test	P. value
	Normal skin N (%)	Worst scar imaginable N (%)	Normal skin N (%)	Worst scar imaginable N (%)		
Thickness					6.3	0.003**
3months	10(50)	8(40)	4(20)	16(30)		
6months	15(75)	5(25)	7(35)	13(65)		
9months	16(80)	4(20)	7(35)	13(65)		
Surface area					5.2	0.07
3months	12(60)	8(40)	4(20)	16 (80)		
6months	14(70)	6(30)	6(30)	14 (70)		
9months	17(85)	3(15)	8(40)	12(60)		
Pigmentation					6.4	0.06
3months	10(50)	10(50)	5(25)	15(75)		
6months	15(75)	5(25)	7(35)	13(65)		
9months	17(85)	3(15)	8(40)	12(60)		
Vascularization					5.4	0.001**
3months	11(55)	9(45)	8(40)	12(60)		
6months	16(80)	4(20)	8(40)	12(60)		
9months	18(90)	2(10)	11(55)	9(45)		
Pliability					7.3	0.001**
3months	12(60)	8(40)	7(35)	13(65)		
6months	17(85)	3(15)	8(40)	12(60)		
9months	18(90)	2(10)	10(50)	10(50)		
Relief					6.3	0.002**
3months	13(65)	7(35)	5(25)	15(75)		
6months	17(85)	3(15)	6(30)	14(70)		
9months	18(90)	2(10)	7(35)	13(65)		

**= highly significant.

Table 3. Comparison between study and control groups regard the Patient sub-Scale (PS) during follow up phases (after three, six and nine months) after their pressure garment application n=40

Items	Study groups (n=20) N (%)		Control groups (n=20) N (%)		T. test	P. value
	Normal skin	Worst scar imaginable	Normal skin	Worst scar imaginable		
Pain					6.5	0.001**
3 months	8(40)	12(60)	6(30)	14(70)		
6 months	12(60)	8(40)	7(35)	13(65)		
9 months	18(90)	2(10)	9(45)	11(55)		
Pruritus					7.3	0.000**
3 months	7(35)	13(70)	5(25)	15(75)		
6 months	13(65)	7(35)	7(35)	13(65)		
9 months	17(85)	3(15)	8(40)	12(60)		

**= highly significant.

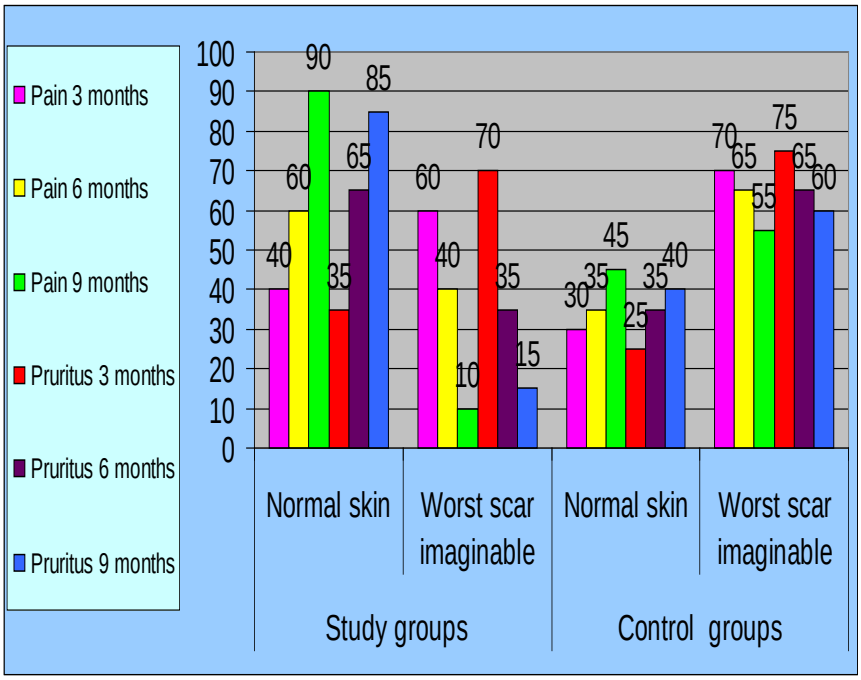

Figure 2. Comparison between study and control groups regard the Patient sub-Scale (PS) during follow up phases (after three, six and nine months) after their pressure garment application n=40

Table 4. The relation between the socio demographic data for the study and control groups and results of total mean of POSAS scar assessment scale during follow up phases n= 40

Socio demographic data	Normal Skin				Worst Scar Imaginable				P. value
	Study group		Control group		Study group		Control group		
	N	%	N	%	N	%	N	%	
Age / years									
- Adolescents' children (10:19years)	11	55	5	25	4	20	11	55	X^2=0.75 0.00*
- Early adulthood (19:21years)	3	15	2	10	2	10	2	10	
Gender									X^2=0.55 0.02*
• Male	6	30	3	15	4	20	5	25	
• Female	8	40	4	20	2	10	8	40	
Level of education									X^2=0.77 0.03*
• Illiterate	0	0	0	0	0	0	2	10	
• Read and write	5	25	5	25	4	20	3	15	
• Secondary school and diploma	8	40	2	10	2	10	8	40	
• University student	1	5	0	0	0	0	0	0	
Employment status									X^2=0.70 0.02*
• Work	1	5	2	10	2	10	4	20	
• Not work	10	50	4	20	3	15	8	40	
• House wife	3	15	1	5	1	5	1	5	
Residence									X^2=0.55 0.02*
• Rural	13	65	6	30	4	20	13	65	
• Urban	1	5	1	5	2	10	0	0	
Location of burn scar									X^2=0.52 0.03*
• Upper extremities	10	50	5	25	5	25	8	40	
• Lower extremities	4	20	2	10	1	5	5	25	

*= Significant
- The mean of normal skin in study group =14
- The mean of normal skin in control group = 7.

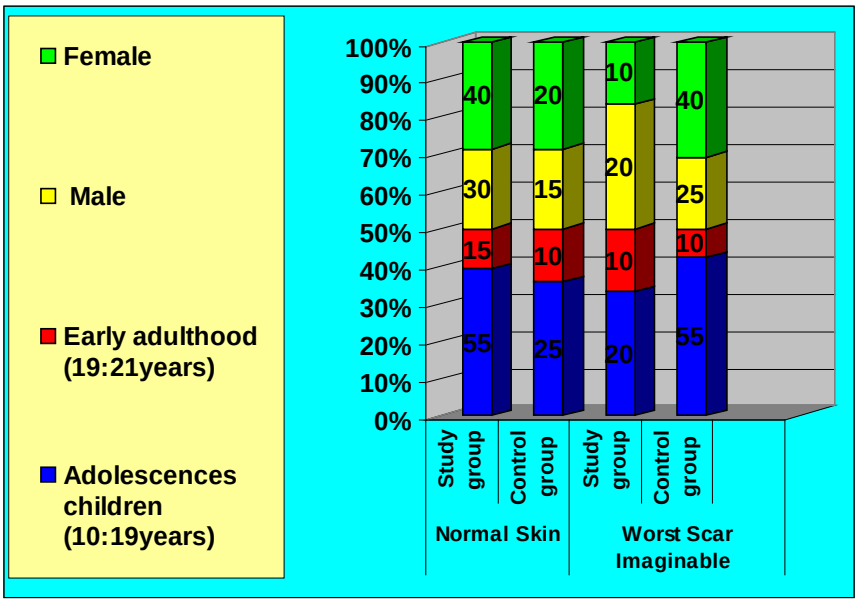

Figure 3. The relation between the age and gender for the study and control groups and results of total mean of POSAS scar assessment scale during follow up phases n= 40

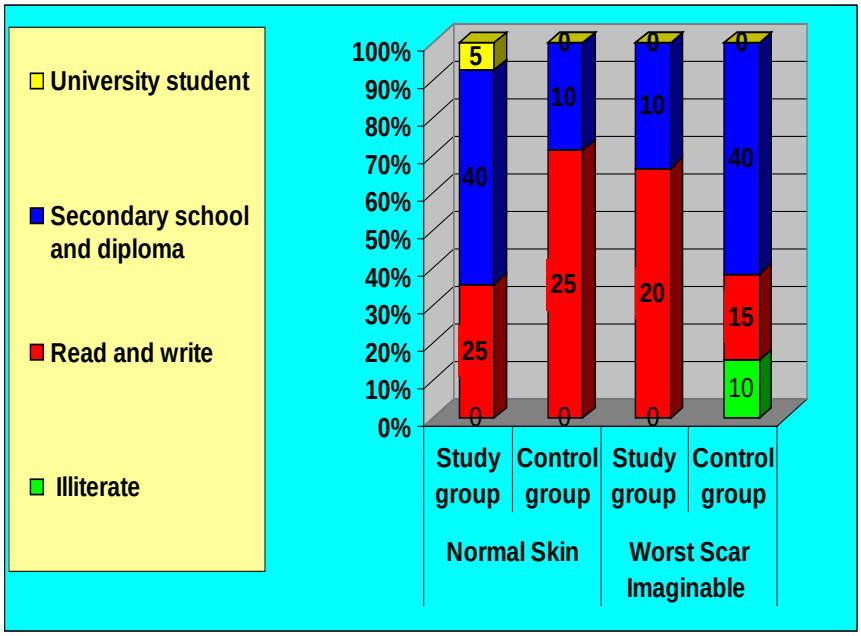

Figure 4. The relation between the level of education for the study and control groups and results of total mean of POSAS scar assessment scale during follow up phases n= 40

Table 5. Correlations between Observer Scale and Patient Scale for the study and the control groups after post burn scare of adolescents' children

	Patient Scale			
	Study		Control	
	R	*P*	R	*P*
Observer Scale	0.94	.000**	0.91	.000**

**= highly significant.

Table 5 shows that, there was a highlest strong positive statistically significant correlation was found between observer scale and patient scale among the study and the control groups in post three observation of burn scare of adolescents' children.

4. Discussion

Burn scar avoidance and administration after skin mending right now incorporates the utilize of pressure garment treatment. These medicines have been schedule practice for burn scar anticipation and administration in spite of the fact that their viability especially in children and adult [11].

The aim of this study to evaluate the using of pressure garment versus hospital routine care on reducing scars immediately after burn surgery.

In the present study about two third were adolescents' children and one fourth were early adult hood in study group, male and female were equal in study group, half of study were have secondary school and diploma education level in study group and two third of study group have upper

extremities burn scare while, in control group about two third adolescents' children and 20% early adult hood, more than half were female, half of control group were have secondary school and diploma education level, and more than half have upper extremities burn scare in control group.

In addition to these physical symptoms, pressure garments may also result in emotional and psychological reactions in children with burn scars through visible cosmetic differences, separate from the visible difference that may result from scarring [3].

In this study there were progress and reduced of burn scare of adolescence children and early adulthood from worst scar imaginable to normal skin after three, six and nine months observation of Patient Scale items including: pain and pruritus, in the study groups more than control groups, is in congruence with Engrav, et al., [12] who stat that, scar prevention and management interventions are initiated with the goal of preventing or reducing scar itch, pain, erythema and pliability with the ultimate goal of maintaining or improving overall appearance of the scar and quality of life. And Jayne, [27] who cited that greatly reducing skin pliability and the current standard of care for the prevention and treatment of scarring following a burn injury is the use of pressure garments [27].

In expansion, negligible research has been completed with a pediatric burns populace or with any age gathers employing a wide assessment that investigates the effectiveness of scar avoidance, their effect on wellbeing-related quality of life on the pediatric patient's adherence to these mediations. While small is known approximately adherence to suggested wear for 23 hours per day and care administrations [28].

In the present study after application of pressure garments the pruritus reduced in study group more than control group during follow up phases after three, six and nine months of using pressure garment therapy. Everett, et al., [16] who reported that, reduce the pruritus has been found post discharge in approximately 80% of patients after burn injury and has been reported to persist for a prolonged period post burn after application of pressure garment. This symptom has a sustained debilitating impact on patients, influencing wound healing, psychological wellbeing, and engagement in activities of daily living. It is, therefore, important that the prevention and management of burn scars is optimum to reduce the impact of scar sequelae, such as pruritus, on psychosocial development and health-related quality of life including the child's ability to independently complete daily activities; and to prevent future invasive scar interventions.

In the present study the scar thickness improved from worst scar imaginable to normal skin after three, six and nine months when using pressure garment in study group more than control group this finding is agreement with Anthonissen, et al., [14] who cited that, scar thickness has traditionally been one of several characteristics used to define the severity of scarring. Scar thickness has been found to be the characteristic that most clearly distinguishes normal skin from hypertrophic scars. Significant reductions in scar redness and thickness were also observed in scars receiving pressure garments therapy [29].

The current study showed that, there was statistically significant correlation between the socio demographic data (age, gender, level of education, employment status, residence and location of burn scar) for the study and control groups and results of total mean of POSAS scar assessment scale during follow up phases (three, six, and nine months) after application of pressure garment for adolescents' children and early adulthood.

5. Conclusion

Pressure garment utilizing was an effective strategy in decreasing burn scar which impacting on mental and activities of day by day living among adolescents' children and early adulthood immediately after burn surgery.

6. Recommendations

Customary preparing programs to keep nurses in burn units upgraded with the evidence-based hones and later methodologies for decreasing burn scar which reflect on persistent physically and mentally.

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