

## **AIM OF THE WORK**

The aim of this study was to compare the effects of warm intrathecal bupivacaine versus cold intrathecal bupivacaine on shivering and haemodynamic stability in parturients candidate for elective cesarean delivery under spinal anaesthesia.

## **PATIENTS**

This study was carried out in El-Shatby Maternity Hospital, Alexandria University on 50 parturients ASA physical status I and II aged between 20- 40 years scheduled for elective cesarean delivery under spinal anaesthesia.

Patients were randomly assigned (double-blind, envelope randomization) into two equal groups (25 patients each) according to the local anaesthetic temperature:

**Group W:** Patients received 2ml heavy bupivacaine 0.5% (10mg) stored at room temperature (23°C) for 1 hour before time of injection (warm group).

**Group C:** Patients received 2ml heavy bupivacaine 0.5% (10mg) stored at 4°C (cold group).

### **Exclusion criteria:**

- Patients with any contraindication to neuraxial blockade were excluded from the study.
- An initial body temperature >38°C or <36°C.
- Hypo- or Hyperthyroidism.
- Psychological disorders.
- Receiving vasodilators or medications likely to alter thermoregulation.

## METHODS

### Pre-operative assessment:

After approval of the local medical ethical committee and an informed written consent taken from all patients included in this study, they were assessed thoroughly by:

- Detailed medical and surgical history taking.
- Full clinical examination.
- Routine laboratory investigations (complete blood picture, coagulation profile, blood urea, serum creatinine and fasting blood sugar).
- On arrival to the operating room, patients were connected to:

#### A. Multi-channel monitor (Mindray MEC-2000) for monitoring:

- Electrocardiogram (ECG).
- Peripheral pulse oximeter.
- Non-invasive arterial blood pressure monitor on the dominant arm.

#### B. Ear and axillary thermometer.

##### Anaesthetic technique:

- An intravenous access using 18- Gauge cannula was placed on the non-dominant arm/hand of all patients.
- 10 ml/kg of intravenous fluids- lactated Ringer's solution- were infused before spinal analgesia.
- All fluids were warmed to 37°C.
- The ambient temperature was measured by a wall thermometer and maintained at 23°C.
- The patients were divided randomly by closed envelope into 2 groups (n=25).
- Group W received 2 ml heavy bupivacaine 0.5% (10 mg) stored at room temperature(23°C)for 1 hour before time of injection (warm group).
- Group C received 2 ml heavy bupivacaine 0.5% (10mg) stored at (4°C) (cold group).
- The spinal technique was performed with the patient in the sitting position at L3-4 or L4-5 using a 25 G Quincke spinal needle.
- Supplemental oxygen (4 L/min) was delivered via facemask during the operation.
- The patient was placed in a supine position with left uterine displacement.
- Upper sensory levels were assessed by cold ice at 5-min intervals until regression to L4.
- A decrease in the mean blood pressure by  $\geq 20\%$  from baseline value was controlled with i.v. ephedrine bolus 6 mg intravenously which was repeated every 1 min. if hypotension persisted or recurred; HR  $< 50$  beats /min was treated with i.v. atropine 0.5 mg.<sup>(63,64)</sup>
- The presence of shivering was observed by an observer blinded to the study local anaesthetic administered.
- If the prophylaxis was regarded as ineffective (Grade 3 or 4 in the shivering score), i.v. meperidine 25 mg was administered.

## **Measurements and recording:**

### **(1) Haemodynamic parameters:**

- Heart rate in beats per minute.
- Arterial oxygen saturation.
- Non-invasive arterial blood pressure ( mean blood pressure in mmHg).

### **Timing of haemodynamic parameters:**

- Preoperatively (a baseline value before giving spinal analgesia and after fluid preload).
- 1 minute after giving spinal analgesia.
- Every 5 minutes until the end of surgery.

### **(2) Temperature monitoring:**

Body temperatures (tympanic and axillary temperature were recorded with an ear thermometer (OMRON Medizintechnik GmbH, Mannheim, Germany) and an axillary thermometer. They were measured before intrathecal injection and at 10 min intervals till the end of the operation and for 1 hour postoperatively.

### **(3) Shivering score:<sup>(65)</sup>**

It was measured before intrathecal injection and at 10 min intervals till the end of the operation and for 1 hour postoperatively.

**Table (I): Shivering score.**

<b>Score</b>	<b>Observation</b>
<b>0</b>	No shivering.
<b>1</b>	Piloerection or peripheral vasoconstriction but no visible shivering.
<b>2</b>	Muscular activity in only one muscle group.
<b>3</b>	Muscular activity in more than one muscle group but not generalized.
<b>4</b>	Shivering involving the whole body.

### **Statistical analysis of the data<sup>(66)</sup>**

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0.<sup>(67)</sup> Qualitative data were described using number and percent. Quantitative data were described using range (minimum and maximum) mean and standard deviation and median. The distributions of quantitative variables were tested for normality. If it reveals normal data distribution, parametric tests was applied. If the data were abnormally distributed, non-parametric tests were used. For normally distributed data, comparison between two independent population were done using independent t-test and comparison between different periods using ANOVA with Post Hoc test was assessed using Bonferroni adjusted. For abnormally distributed data, comparison between two independent population were done using Mann Whitney test. Significance of the obtained results was judged at the 5% level.

## RESULTS

This study was performed in El Shatby University Hospital on 50 patients scheduled for elective cesarean section under spinal anaesthesia. Subarachnoid block technique was successfully performed with no technical problems. Patients were divided into 2 groups (25 patients each).

### **Demographic data (Table II. Figure 6,7and 8)**

#### **Age (years)**

The age ranged between 20-40 and 20-39 with a mean of  $30.6 \pm 6.08$  and  $31.6 \pm 5.52$  (years) for the two studied groups W, C respectively. There were no statistical significant differences between the two studied groups regarding age.

#### **Weight (kgs)**

The weight ranged between 73-90 and 71-90 with a mean of  $81.8 \pm 5.26$  and  $80.45 \pm 6.18$  kgs for the two studied groups W, C respectively. There were no statistical significant differences between the two studied groups.

#### **Height (cms)**

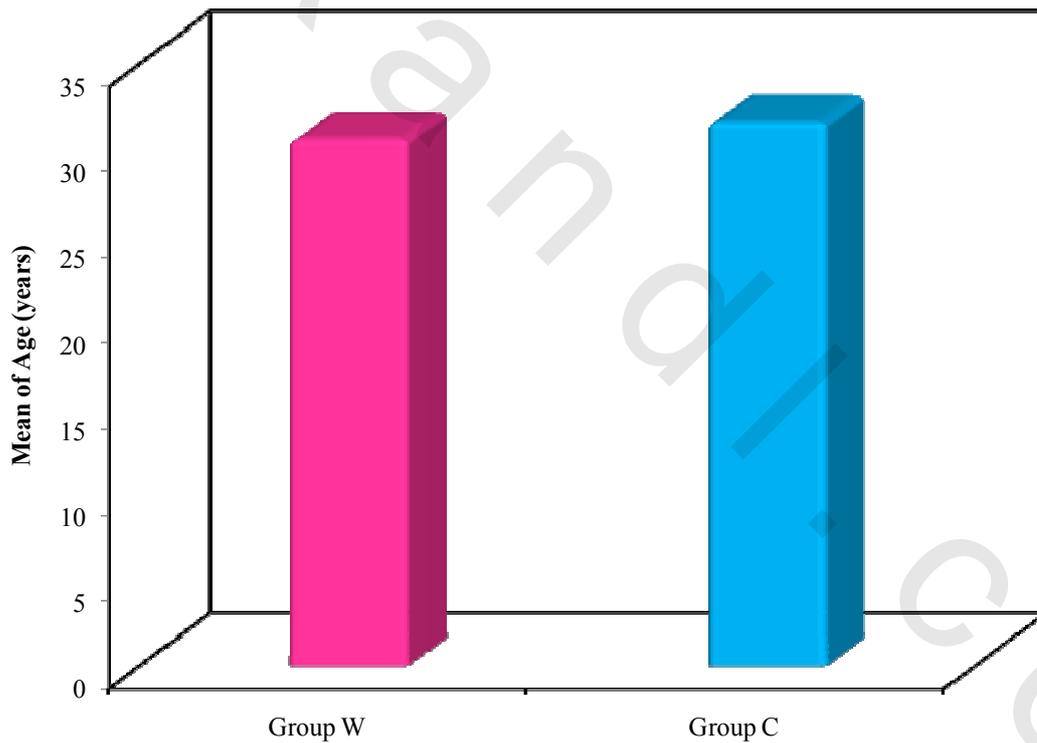
The height ranged between 155-175 and 155-170 with a mean of  $165.9 \pm 6.5$  and  $162.8 \pm 4.46$  (cms) for the two studied groups W, C, respectively. There were no statistical significant differences between the two studied groups.

## Results

**Table (II): Comparison between the two studied groups according to demographic data (n = 25)**

	Group W	Group C	t	p
<b>Age (years)</b>				
Range	20.0 – 40.0	20.0 – 39.0		
Mean ± SD	30.6 ± 6.08	31.6 ± 5.52	0.609	0.546
<b>Weight (Kgs)</b>				
Range	73.0 – 90.0	71.0 – 90.0		
Mean ± SD	81.8 ± 5.26	80.45 ± 6.18	0.832	0.409
<b>Height (cms)</b>				
Range	155.0 – 175.0	155.0 – 170.0		
Mean ± SD	165.9 ± 6.5	162.8 ± 4.46	1.966	0.051

t: Student t-test



**Figure (6): Comparison between the two studied groups according to Age (years)**

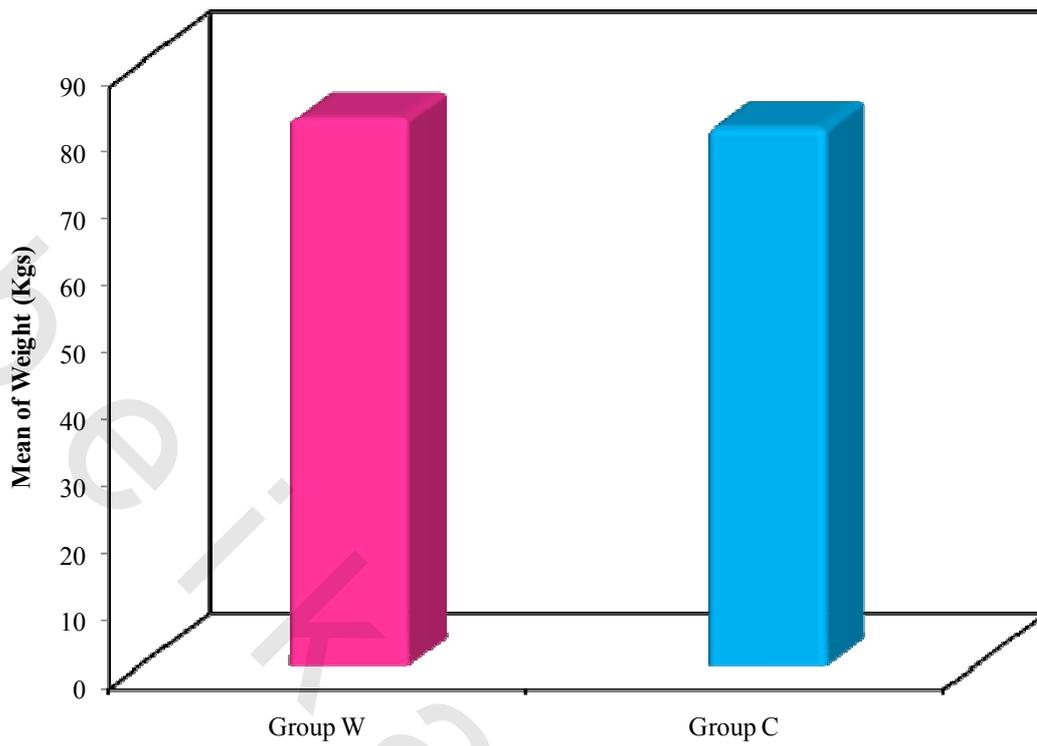


Figure (7): Comparison between the two studied groups according to Weight (Kgs)

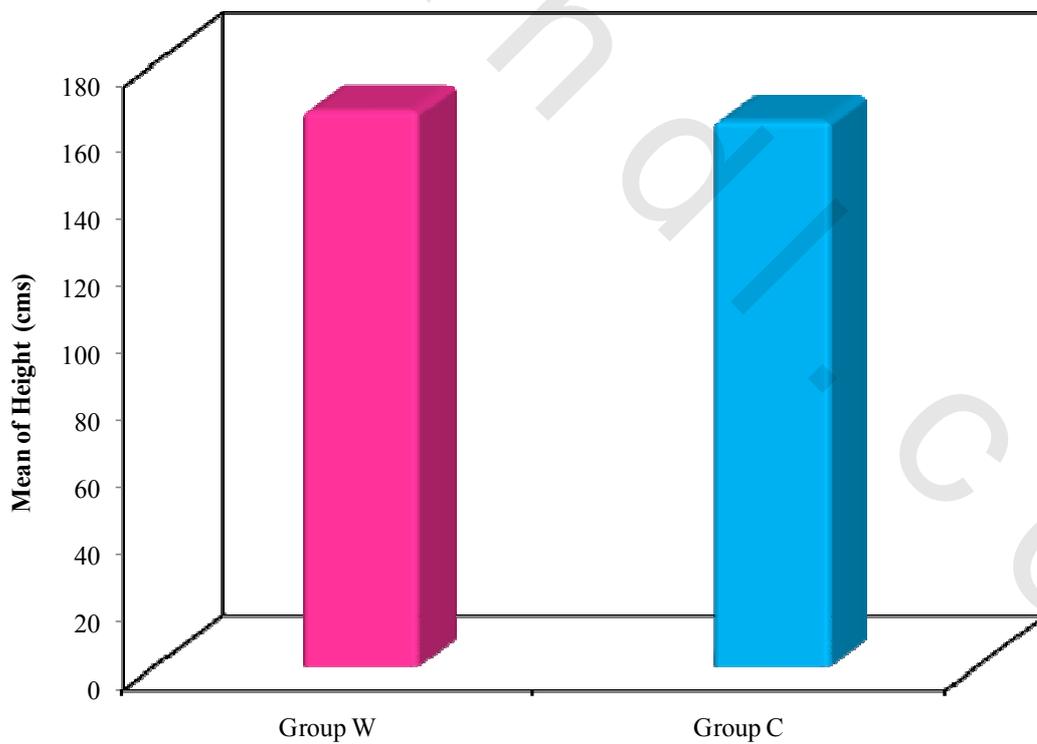


Figure (8): Comparison between the two studied groups according to Height (cms)

**Changes in heart rate (beats/minutes): (Table III, IV and V. Figure 9)**

In group W, it was found that the heart rate immediately before spinal analgesia ranged from 75-97(beats/min), with a mean of  $83.80 \pm 6.73$  (beats/min). All over the period of follow up after the spinal anaesthesia, there was no significant change in heart rate.

In group C, the heart rate immediately before spinal ranged from 71-99(beats/min). With a mean of  $85.64 \pm 7.57$ (beats/min). All over the period of follow up after the spinal anaesthesia, there was no significant change in heart rate.

Comparison between the two studied groups showed no significant differences at all the measured times.

**Table (III): Changes in heart rate in (beats/minutes) in group W :**

Cases No.	Heart rate										
	Pre-operative	After giving spinal analgesia									
		1 min	5 min	10 min	15 min	20 min	25 min	30 min	35 min	40 min	45 min
1	90	97	60	65	70	95	92	90	88	96	94
2	83	87	87	89	87	83	90	98	95	90	92
3	87	75	86	84	83	85	92	92	79	92	88
4	75	78	89	75	90	87	92	95	96	90	92
5	77	97	97	97	94	89	85	82	99	85	92
6	87	87	70	62	64	65	78	86	82	88	90
7	83	89	89	90	89	98	102	98	97	92	101
8	76	87	83	94	85	85	70	87	85	92	88
9	97	89	82	89	113	100	92	80	95	97	88
10	80	89	80	94	84	78	84	93	86	82	92
11	78	78	62	64	60	74	87	89	90	75	72
12	76	83	86	84	89	89	102	87	88	64	72
13	89	97	78	94	90	89	98	86	91	88	92
14	76	78	87	89	87	98	103	76	96	75	76
15	86	84	62	65	68	74	85	89	84	82	84
16	87	89	96	98	88	88	90	92	86	94	89
17	76	73	85	82	85	84	88	86	90	87	90
18	83	82	85	115	105	86	87	85	83	88	85
19	85	82	82	89	90	90	90	86	86	84	92
20	86	84	80	79	82	84	88	90	75	86	89
21	92	101	83	65	64	68	75	88	95	94	88
22	92	88	85	82	87	91	77	78	90	83	85
23	97	88	82	77	86	82	81	84	88	90	93
24	82	92	95	86	82	80	80	89	90	83	84
25	75	72	77	82	110	113	90	80	90	88	87
Min.	75.0	72.0	60.0	62.0	60.0	65.0	70.0	76.0	75.0	64.0	72.0
Max.	97.0	101.0	97.0	115.0	113.0	113.0	103.0	98.0	99.0	97.0	101.0
Mean	83.80	85.84	81.92	83.60	85.28	86.20	87.92	87.44	88.96	86.60	87.80
±SD.	6.73	7.63	9.74	12.74	13.01	10.32	8.32	5.63	5.88	7.34	6.59
Median	83.0	87.0	83.0	84.0	87.0	86.0	88.0	87.0	90.0	88.0	89.0
P		NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between base line with each other period

\*: Statistically significant at  $p \leq 0.05$

**Table (IV): Changes in heart rate in (beats/minutes) in group C :**

Cases No.	Heart rate										
	Pre-operative	After giving spinal analgesia									
		1 min	5 min	10 min	15 min	20 min	25 min	30 min	35 min	40 min	45 min
1	78	79	80	82	80	80	72	77	90	92	85
2	80	78	78	79	80	81	72	78	89	94	88
3	90	89	88	90	92	88	92	93	87	83	85
4	77	76	60	63	62	74	76	77	80	90	93
5	80	81	85	85	88	82	84	83	87	83	84
6	99	98	85	92	85	90	94	98	88	88	87
7	90	91	89	94	88	90	92	92	88	98	90
8	88	82	82	110	100	92	88	85	85	82	87
9	90	98	89	90	93	90	92	93	81	77	86
10	81	83	64	61	60	75	92	86	88	86	82
11	90	89	80	92	87	85	89	91	88	82	74
12	80	84	81	88	82	87	90	92	88	79	80
13	89	88	82	84	85	88	85	87	89	90	92
14	87	89	83	85	84	84	92	93	82	78	79
15	80	85	86	79	88	86	89	92	82	85	88
16	83	85	86	113	95	88	90	92	87	92	87
17	98	93	87	98	90	87	101	97	95	88	82
18	71	77	66	63	74	87	88	85	90	84	85
19	80	81	84	77	86	85	88	82	88	85	84
20	78	80	79	86	82	82	92	95	90	79	88
21	98	90	88	85	86	87	79	80	90	89	87
22	91	89	88	93	96	95	78	78	89	84	87
23	82	82	73	60	70	82	89	88	87	88	87
24	98	89	81	81	100	88	76	78	80	89	83
25	83	84	88	80	89	90	81	85	87	85	86
<b>Min.</b>	71.0	76.0	60.0	60.0	60.0	74.0	72.0	77.0	80.0	77.0	74.0
<b>Max.</b>	99.0	98.0	89.0	113.0	100.0	95.0	101.0	98.0	95.0	98.0	93.0
<b>Mean</b>	85.64	85.60	81.28	84.40	84.88	85.72	86.44	87.08	87.0	86.0	85.44
<b>±SD.</b>	7.57	5.97	7.88	13.27	10.06	4.91	7.38	6.63	3.57	5.19	4.04
<b>Median</b>	83.0	85.0	83.0	85.0	86.0	87.0	89.0	87.0	88.0	85.0	86.0
<b>P</b>		NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between base line with each other period

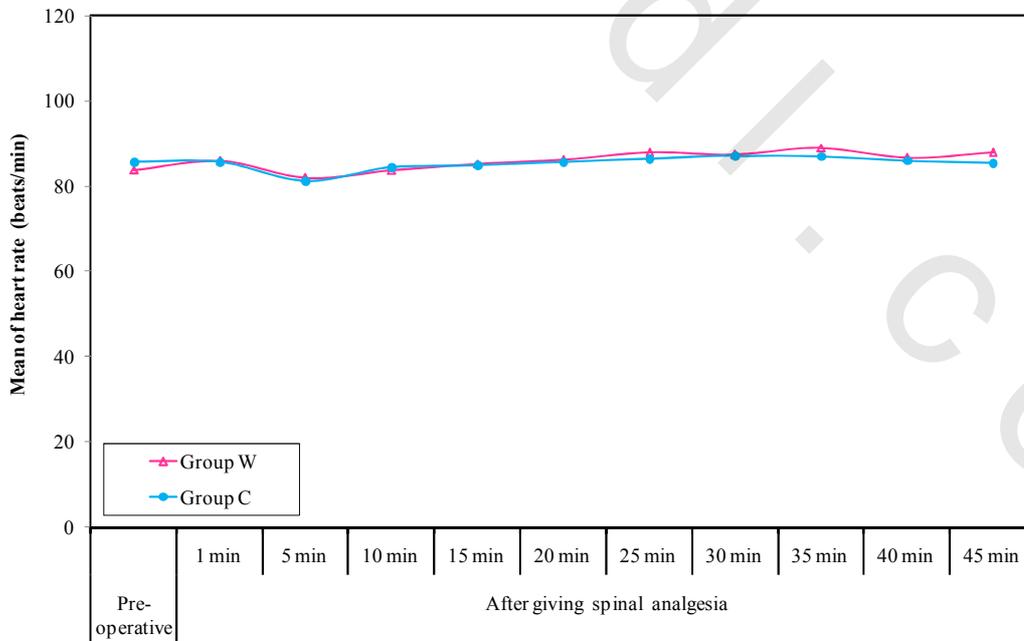
\*: Statistically significant at  $p \leq 0.05$

**Table (V): Comparison between the studied groups according to heart rate (beats/minutes):**

	Heart rate										
	Pre-operative	After giving spinal analgesia									
		1 min	5 min	10 min	15 min	20 min	25 min	30 min	35 min	40 min	45 min
<b>Group W</b>											
Min.	75.0	72.0	60.0	62.0	60.0	65.0	70.0	76.0	75.0	64.0	72.0
Max.	97.0	101.0	97.0	115.0	113.0	113.0	103.0	98.0	99.0	97.0	101.0
Mean	83.80	85.84	81.92	83.60	85.28	86.20	87.92	87.44	88.96	86.60	87.80
±SD.	6.73	7.63	9.74	12.74	13.01	10.32	8.32	5.63	5.88	7.34	6.59
Median	83.0	87.0	83.0	84.0	87.0	86.0	88.0	87.0	90.0	88.0	89.0
<b>Group C</b>											
Min.	71.0	76.0	60.0	60.0	60.0	74.0	72.0	77.0	80.0	77.0	74.0
Max.	99.0	98.0	89.0	113.0	100.0	95.0	101.0	98.0	95.0	98.0	93.0
Mean	85.64	85.60	81.28	84.40	84.88	85.72	86.44	87.08	87.0	86.0	85.44
±SD.	7.57	5.97	7.88	13.27	10.06	4.91	7.38	6.63	3.57	5.19	4.04
Median	83.0	85.0	83.0	85.0	86.0	87.0	89.0	87.0	88.0	85.0	86.0
<b>t</b>	0.908	0.124	0.255	0.217	0.122	0.210	0.666	0.207	1.424	0.334	1.526
<b>p</b>	0.368	0.902	0.799	0.829	0.904	0.835	0.509	0.837	0.162	0.740	0.133

t: Student t-test

\*: Statistically significant at  $p \leq 0.05$



**Figure (9): Comparison between the studied groups according to heart rate (beats/min).**

**Changes in Mean arterial blood pressure (mmHg) (Table VI, VII and VIII. Figure 10)**

In group W, it was found that the mean arterial blood pressure, immediately before spinal anaesthesia, ranged from 74-101 (mmHg), with a mean of 88.08±8.06 (mmHg). One minute later on, there was a significant decrease in mean arterial blood pressure reaching 77.44±5.30 (mmHg). At 5, 10, 15, 20, 25 and 30 minutes after spinal anaesthesia, there was a significant decrease in mean arterial blood pressure from the base line, while at 35, 40 and 45 minutes, there was no significant difference from base line.

In group C, it was found the mean arterial blood pressure, immediately before spinal anaesthesia, ranged from 73-98 (mmHg), with a mean of 87.24±7.39 (mmHg). One minute later on, there was a significant decrease in mean arterial blood pressure reaching 76.16±5.93 (mmHg). At 5, 10, 15, 20, 25 and 30 minutes after spinal anaesthesia, there was a significant decrease in mean arterial blood pressure from the base line, while at 35, 40 and 45 minutes, there was no significant difference from base line.

Comparison between the two studied groups showed no significant differences at all the measured times.

**Table (VI): Changes in mean arterial blood pressure(mmHg) in group W:**

Cases No.	Mean arterial blood pressure										
	Pre-operative	After giving spinal analgesia									
		1 min	5 min	10 min	15 min	20 min	25 min	30 min	35 min	40 min	45 min
1	76	75	95	64	69	75	72	80	77	85	85
2	90	75	88	79	79	76	72	80	91	83	88
3	87	76	63	71	81	80	68	81	88	79	82
4	97	81	95	82	83	75	83	83	98	93	87
5	101	83	89	83	86	79	84	84	102	95	90
6	83	76	76	73	75	72	73	74	83	84	86
7	90	79	89	80	81	76	78	81	90	88	88
8	101	83	90	91	92	80	88	88	101	96	90
9	81	72	60	68	75	72	69	76	81	80	86
10	95	82	89	86	84	80	84	87	95	94	91
11	80	73	69	61	71	77	72	77	77	81	85
12	90	80	89	83	83	76	82	84	87	91	92
13	74	67	69	68	68	64	66	69	71	76	80
14	89	76	84	83	81	77	78	84	86	87	88
15	97	92	73	64	77	86	86	90	91	95	93
16	87	72	78	77	77	72	71	78	87	81	86
17	97	81	88	86	85	80	83	87	97	93	92
18	81	76	63	75	75	72	73	76	78	84	86
19	80	73	72	70	72	72	70	71	76	80	81
20	82	73	75	75	74	72	72	76	78	82	83
21	99	83	87	85	84	89	84	86	88	94	91
22	96	83	88	87	86	80	85	88	90	95	93
23	87	78	83	79	80	73	78	80	84	88	87
24	82	75	64	70	73	72	73	78	78	81	81
25	80	72	55	73	73	69	71	74	76	81	83
Min.	74.0	67.0	55.0	61.0	68.0	64.0	66.0	69.0	71.0	76.0	80.0
Max.	101.0	92.0	95.0	91.0	92.0	89.0	88.0	90.0	102.0	96.0	93.0
Mean	88.08	77.44	78.84	76.52	78.56	75.84	76.60	80.48	86.0	86.64	86.96
±SD.	8.06	5.30	11.84	8.16	6.06	5.30	6.60	5.61	8.50	6.28	3.90
Median	87.0	76.0	83.0	77.0	79.0	76.0	73.0	80.0	87.0	85.0	87.0
p		<0.001*	0.003*	0.001*	<0.001*	<0.001*	<0.001*	<0.001*	NS	NS	NS
		>0.05	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between base line with each other period

\*: Statistically significant at  $p \leq 0.05$

**Results**

**Table (VII): Changes in mean arterial blood pressure (mmHg) in group C:**

Cases No.	Mean arterial blood pressure										
	Pre-operative	After giving spinal analgesia									
		1 min	5 min	10 min	15 min	20 min	25 min	30 min	35 min	40 min	45 min
1	83	74	69	70	74	73	75	76	84	82	84
2	93	79	75	74	74	75	77	78	88	86	84
3	89	81	80	77	78	78	80	82	89	89	88
4	83	73	63	68	69	69	73	72	82	80	83
5	90	75	75	76	77	73	75	77	88	87	86
6	97	82	83	83	82	79	83	83	96	95	92
7	81	74	70	72	71	70	72	75	86	82	85
8	94	82	78	81	80	81	84	85	93	94	92
9	75	68	72	69	70	66	72	69	83	81	84
10	92	82	77	72	78	78	82	83	92	90	92
11	97	84	85	83	82	82	85	85	96	96	92
12	82	76	72	71	71	72	74	76	84	82	86
13	73	65	63	57	71	65	67	69	84	80	82
14	91	82	79	75	77	77	82	81	89	87	91
15	90	81	80	81	81	78	82	82	94	92	91
16	85	76	68	73	75	70	74	75	86	84	87
17	87	73	73	75	77	72	74	75	88	85	88
18	94	79	82	80	81	80	81	83	91	91	91
19	75	62	64	66	67	63	64	65	81	76	77
20	97	81	74	83	81	76	84	82	101	94	90
21	90	76	76	78	80	75	76	79	89	88	87
22	98	83	84	83	83	82	84	86	94	94	90
23	79	67	69	67	68	65	69	68	82	78	82
24	81	75	77	64	77	75	76	80	88	88	87
25	85	74	77	76	77	73	76	77	87	88	86
<b>Min.</b>	73.0	62.0	63.0	57.0	67.0	63.0	64.0	65.0	81.0	76.0	77.0
<b>Max.</b>	98.0	84.0	85.0	83.0	83.0	82.0	85.0	86.0	101.0	96.0	92.0
<b>Mean</b>	87.24	76.16	74.60	74.16	76.04	73.88	76.84	77.72	88.60	86.76	87.08
<b>±SD.</b>	7.39	5.93	6.31	6.74	4.81	5.46	5.71	5.78	5.07	5.67	3.91
<b>Median</b>	89.0	76.0	75.0	75.0	77.0	75.0	76.0	78.0	88.0	87.0	87.0
<b>p</b>		<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	NS >0.05	NS >0.05	NS >0.05

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between base line with each other period

\*: Statistically significant at  $p \leq 0.05$

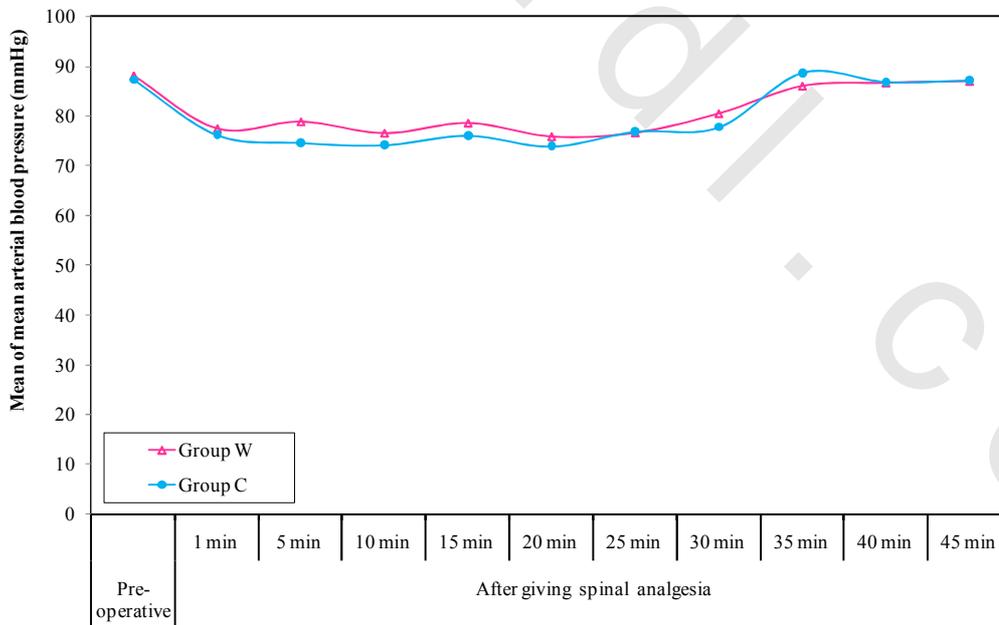
**Results**

**Table (VIII): Comparison between the studied groups according to mean arterial blood pressure (mmHg):**

	Mean arterial blood pressure										
	Pre-operative	After giving spinal analgesia									
		1 min	5 min	10 min	15 min	20 min	25 min	30 min	35 min	40 min	45 min
<b>Group W</b>											
Min.	74.0	67.0	55.0	61.0	68.0	64.0	66.0	69.0	71.0	76.0	80.0
Max.	101.0	92.0	95.0	91.0	92.0	89.0	88.0	90.0	102.0	96.0	93.0
Mean	88.08	77.44	78.84	76.52	78.56	75.84	76.60	80.48	86.0	86.64	86.96
±SD.	8.06	5.30	11.84	8.16	6.06	5.30	6.60	5.61	8.50	6.28	3.90
Median	87.0	76.0	83.0	77.0	79.0	76.0	73.0	80.0	87.0	85.0	87.0
<b>Group C</b>											
Min.	73.0	62.0	63.0	57.0	67.0	63.0	64.0	65.0	81.0	76.0	77.0
Max.	98.0	84.0	85.0	83.0	83.0	82.0	85.0	86.0	101.0	96.0	92.0
Mean	87.24	76.16	74.60	74.16	76.04	73.88	76.84	77.72	88.60	86.76	87.08
±SD.	7.39	5.93	6.31	6.74	4.81	5.46	5.71	5.78	5.07	5.67	3.91
Median	89.0	76.0	75.0	75.0	77.0	75.0	76.0	78.0	88.0	87.0	87.0
<b>t</b>	0.384	0.805	1.580	1.115	1.629	1.287	0.138	1.714	1.313	0.071	0.109
<b>p</b>	0.703	0.425	0.123	0.270	0.110	0.204	0.891	0.093	0.197	0.944	0.914

t: Student t-test

\*: Statistically significant at  $p \leq 0.05$



**Figure (10): Comparison between the studied groups according to mean arterial blood pressure (mmHg).**

**Changes in peripheral arterial Oxygen Saturation (S<sub>p</sub>O<sub>2</sub>%): (Table IX, X and XI. Figure 11)**

In group W, it was found that the mean of oxygen saturation, immediately before spinal anaesthesia, ranged from 97-100 (%) with a mean of 99±0.96(%). All over the time periods of follow up after the spinal anaesthesia, there were no significant changes in the oxygen saturation.

In group C, the mean of oxygen saturation, immediately before spinal anaesthesia, ranged from 97-100 (%) with a mean of 98.92±0.64(%). All over the time periods of follow up after the spinal anaesthesia, there were no significant changes in the oxygen saturation.

Comparison between the two studied groups showed no significant differences at all the measured times.

**Table (IX): Changes in peripheral arterial oxygen saturation (S<sub>p</sub>O<sub>2</sub>%) in group W:**

Cases No.	Peripheral arterial oxygen saturation										
	Pre-operative	After giving spinal analgesia									
		1 min	5 min	10 min	15 min	20 min	25 min	30 min	35 min	40 min	45 min
1	99	100	100	100	100	100	99	99	99	100	100
2	99	99	99	99	99	99	98	99	98	99	99
3	98	99	99	99	99	99	99	99	98	99	99
4	97	99	100	100	100	100	99	99	99	99	100
5	99	99	98	98	99	99	99	99	99	99	98
6	100	99	99	100	99	100	99	99	99	99	99
7	98	99	99	99	99	99	99	99	98	99	99
8	100	100	99	97	98	97	99	99	99	100	99
9	99	99	99	99	99	99	99	99	98	99	99
10	100	100	98	98	100	100	98	99	98	100	98
11	99	100	97	99	100	100	98	99	99	100	97
12	99	99	99	99	99	99	99	99	98	99	99
13	99	99	99	99	99	99	99	99	99	99	99
14	100	100	100	100	99	100	99	99	99	100	100
15	97	97	96	97	99	98	99	99	99	97	96
16	100	100	100	100	100	100	99	99	99	100	100
17	99	99	99	99	99	99	99	99	99	99	99
18	97	100	100	100	100	100	99	99	99	100	100
19	100	100	100	100	100	100	99	98	99	100	100
20	99	99	99	99	99	99	99	99	99	99	99
21	100	100	100	99	100	98	100	100	100	100	100
22	99	99	99	99	99	98	99	99	99	99	99
23	99	99	99	98	97	98	99	99	100	100	100
24	100	100	100	99	99	99	99	100	99	100	100
25	99	99	99	100	100	98	99	98	99	99	99
Min.	97.0	97.0	96.0	97.0	97.0	97.0	98.0	98.0	98.0	97.0	96.0
Max.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mean	99.0	99.32	99.04	99.04	99.24	99.08	98.92	99.0	98.84	99.36	99.08
±SD.	0.96	0.69	0.98	0.89	0.72	0.86	0.40	0.41	0.55	0.70	1.0
Median	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0
P		NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between base line with each other period

\*: Statistically significant at p ≤ 0.05

**Results**

**Table (X): Changes in peripheral arterial oxygen saturation (SpO<sub>2</sub>%) in group C:**

Cases No.	Arterial oxygen saturation										
	Pre-operative	After giving spinal analgesia									
		1 min	5 min	10 min	15 min	20 min	25 min	30 min	35 min	40 min	45 min
1	99	99	100	99	98	100	97	99	99	99	99
2	99	99	99	99	99	99	99	99	99	99	99
3	99	99	100	100	100	99	99	99	99	99	99
4	100	100	99	99	99	100	100	100	99	99	100
5	99	99	99	99	99	97	96	97	99	99	99
6	99	98	100	99	99	100	100	100	99	99	99
7	99	99	99	99	99	99	99	99	99	99	99
8	99	99	99	99	99	99	99	99	99	99	99
9	99	99	100	100	100	99	100	100	99	99	99
10	99	98	99	99	99	99	98	98	99	99	99
11	99	98	98	98	99	100	100	100	100	100	99
12	99	99	99	99	99	99	99	99	99	99	99
13	100	100	100	100	100	100	100	100	99	99	100
14	99	99	100	100	100	100	100	100	100	99	99
15	99	99	99	99	99	99	99	99	99	99	99
16	99	99	98	99	98	99	99	100	99	99	99
17	99	99	99	98	99	99	99	99	99	99	99
18	99	100	98	99	99	100	99	97	98	99	99
19	99	100	99	99	99	99	99	99	99	99	99
20	99	99	98	98	98	100	98	98	99	99	99
21	97	99	100	100	100	100	100	100	99	99	97
22	99	99	99	99	99	99	99	99	99	99	99
23	99	99	99	99	99	100	100	100	100	99	99
24	100	100	99	100	100	100	100	100	99	99	100
25	96	97	99	98	98	99	99	99	100	98	96
<b>Min.</b>	97.0	96.0	97.0	98.0	98.0	98.0	97.0	96.0	97.0	98.0	98.0
<b>Max.</b>	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Mean</b>	98.92	98.92	99.0	99.12	99.08	99.08	99.36	99.08	99.16	99.12	99.0
<b>±SD.</b>	0.64	0.81	0.71	0.67	0.64	0.64	0.70	1.0	0.90	0.44	0.29
<b>Median</b>	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0
<b>p</b>		NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05	NS >0.05

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between base line with each other period

\*: Statistically significant at  $p \leq 0.05$

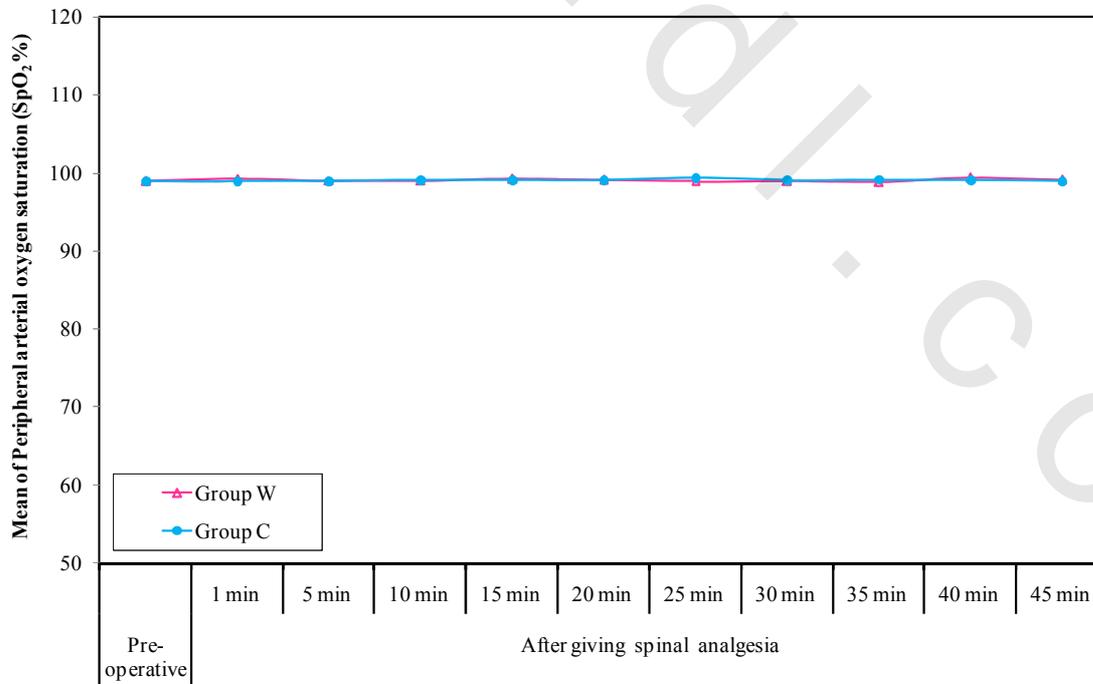
**Results**

**Table (XI): Comparison between the studied groups according to peripheral arterial oxygen saturation ( $S_pO_2\%$ ):**

	Arterial oxygen saturation										
	Pre-operative	After giving spinal analgesia									
		1 min	5 min	10 min	15 min	20 min	25 min	30 min	35 min	40 min	45 min
<b>Group W</b>											
Min.	97.0	97.0	96.0	97.0	97.0	97.0	98.0	98.0	98.0	97.0	96.0
Max.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mean	99.0	99.32	99.04	99.04	99.24	99.08	98.92	99.0	98.84	99.36	99.08
±SD.	0.96	0.69	0.98	0.89	0.72	0.86	0.40	0.41	0.55	0.70	1.0
Median	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0
<b>Group C</b>											
Min.	97.0	96.0	97.0	98.0	98.0	98.0	97.0	96.0	97.0	98.0	98.0
Max.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Mean	98.92	98.92	99.0	99.12	99.08	99.08	99.36	99.08	99.16	99.12	99.0
±SD.	0.64	0.81	0.71	0.67	0.64	0.64	0.70	1.0	0.90	0.44	0.29
Median	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0
<b>t</b>	0.347	1.876	0.166	0.360	0.828	0.000	2.729	0.371	1.516	1.452	0.385
<b>p</b>	0.730	0.067	0.869	0.720	0.412	1.000	0.010	0.713	0.136	0.154	0.703

t: Student t-test

\*: Statistically significant at  $p \leq 0.05$



**Figure (11): Comparison between the studied groups according to peripheral arterial oxygen saturation ( $S_pO_2\%$ ).**

**Changes in Axillary Temperature (°C) (Table XII, XIII and XIV. Figure 12)**

In group W: it was found that the mean of axillary temperature, immediately before spinal anaesthesia, ranged from 35.9-36.9 (°C) with a mean of 36.20±0.34 (°C). 20 minutes after spinal anaesthesia, there was a significant decrease in the axillary temperature reached a mean of 35.92±0.35 (°C). Later on, all over the time periods of the study, there was a significant decrease in axillary temperature.

In group C: it was found that the mean of axillary temperature, immediately before spinal anaesthesia, ranged from 35.80-36.80 (°C) with a mean of 36.10±0.36 (°C). 20 minutes after spinal anaesthesia, there was a significant decrease in the axillary temperature reached a mean of 35.87±0.35 (°C). Later on, all over the time periods of the study, there was a significant decrease in axillary temperature.

Comparison between the two studied groups showed no significant differences at all the measured times.

**Table (XII): Changes in body temperature (°C) using axillary thermometer in group W:**

Cases No.	Body temperature using axillary thermometer						
	Pre-operative	10 min	20 min	30 min	40 min	50 min	1 hour postoperative
1	36.9	36.7	36.6	36.5	36.5	36.4	36.4
2	36.3	36.4	35.6	35.7	35.7	35.6	36.1
3	36.3	36.4	36.2	36.1	36	35.9	36.1
4	36.5	36.5	36.2	36	35.9	35.9	36.1
5	35.9	35.9	35.6	35.5	35.5	35.4	35.7
6	35.9	36	35.6	35.5	35.5	35.4	35.7
7	36.6	36.7	36.5	36.4	36.4	36.4	36.5
8	36.2	36.3	35.8	35.6	35.5	35.5	35.9
9	35.9	35.8	35.6	35.5	35.5	35.4	35.7
10	36.9	36.8	36.5	36.3	36.3	36.2	36.5
11	35.9	35.9	35.8	35.6	35.5	35.5	35.7
12	35.9	35.8	35.6	35.5	35.5	35.4	35.7
13	36.6	36.7	36.5	36.3	36.3	36.2	36.3
14	36.6	36.7	36.2	36.1	36.1	36	36.6
15	35.9	35.8	35.6	35.5	35.5	35.4	35.7
16	35.9	35.9	35.8	35.6	35.5	35.5	35.7
17	36.3	36.3	35.9	35.7	35.6	35.6	36
18	36.1	36.1	35.8	35.6	35.5	35.4	35.8
19	36	36	35.7	35.6	35.5	35.4	35.8
20	35.9	35.8	35.6	35.5	35.5	35.4	35.7
21	35.9	35.8	35.6	35.5	35.5	35.4	35.7
22	35.9	35.9	35.8	35.6	35.6	35.5	35.8
23	35.9	35.8	35.6	35.5	35.5	35.4	35.7
24	36.5	36.6	36.4	36.2	36.2	36.1	36.2
25	36.3	36.3	36	35.9	35.8	35.7	36.1
Min.	35.90	35.80	35.60	35.50	35.50	35.40	35.70
Max.	36.90	36.80	36.60	36.50	36.50	36.40	36.60
Mean	36.20	36.20	35.92	35.79	35.76	35.68	35.97
±SD.	0.34	0.36	0.35	0.34	0.35	0.35	0.30
Median	36.10	36.10	35.80	35.60	35.50	35.50	35.80
p		NS >0.05	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between base line with each other period

\*: Statistically significant at  $p \leq 0.05$

Table (XIII): Changes in body temperature (°C) using axillary thermometer in group C:

Cases No.	Body temperature using axillary thermometer						
	Pre-operative	10 min	20 min	30 min	40 min	50 min	1 hour postoperative
1	36.3	36.3	36	35.8	35.8	35.7	35.8
2	35.9	35.9	35.65	35.6	35.5	35.5	35.7
3	35.8	35.8	35.65	35.6	35.5	35.5	35.7
4	35.8	35.8	35.65	35.6	35.5	35.5	35.7
5	35.9	35.8	35.65	35.6	35.5	35.5	35.7
6	36.1	36.1	35.8	35.7	35.6	35.5	35.9
7	36.7	36.6	36.62	36.6	36.5	36.6	36.3
8	36.6	36.5	36	35.8	35.8	35.7	36.3
9	36	36	35.65	35.6	35.5	35.5	35.7
10	36.1	36.1	35.7	35.6	35.5	35.5	35.7
11	35.8	35.8	35.65	35.6	35.5	35.5	35.7
12	35.8	35.8	35.65	35.6	35.5	35.5	35.7
13	35.9	35.9	35.65	35.6	35.5	35.5	35.7
14	36	36	35.7	35.6	35.5	35.5	35.7
15	35.9	35.8	35.7	35.6	35.5	35.5	35.7
16	35.8	35.8	35.65	35.6	35.5	35.5	35.7
17	35.8	35.8	35.65	35.6	35.5	35.5	35.7
18	35.8	35.8	35.65	35.6	35.5	35.5	35.7
19	35.8	35.8	35.65	35.6	35.5	35.5	35.7
20	36.7	36.6	36.62	36.3	36.5	36.6	36.2
21	35.8	35.8	35.65	35.6	35.5	35.5	35.7
22	36.7	36.7	36.3	36.1	36	35.9	36.6
23	36.8	36.7	36.4	36.3	36.5	36.6	36.3
24	36.6	36.6	36.62	36.3	36.5	36.6	36.4
25	36.2	36.1	35.9	35.8	35.7	35.7	35.8
Min.	35.80	35.80	35.65	35.60	35.50	35.50	35.70
Max.	36.80	36.70	36.62	36.60	36.50	36.60	36.60
Mean	36.10	36.08	35.87	35.77	35.72	35.72	35.87
±SD.	0.36	0.34	0.35	0.30	0.37	0.41	0.29
Median	35.90	35.90	35.65	35.60	35.50	35.50	35.70
p		NS >0.05	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between base line with each other period

\*: Statistically significant at  $p \leq 0.05$

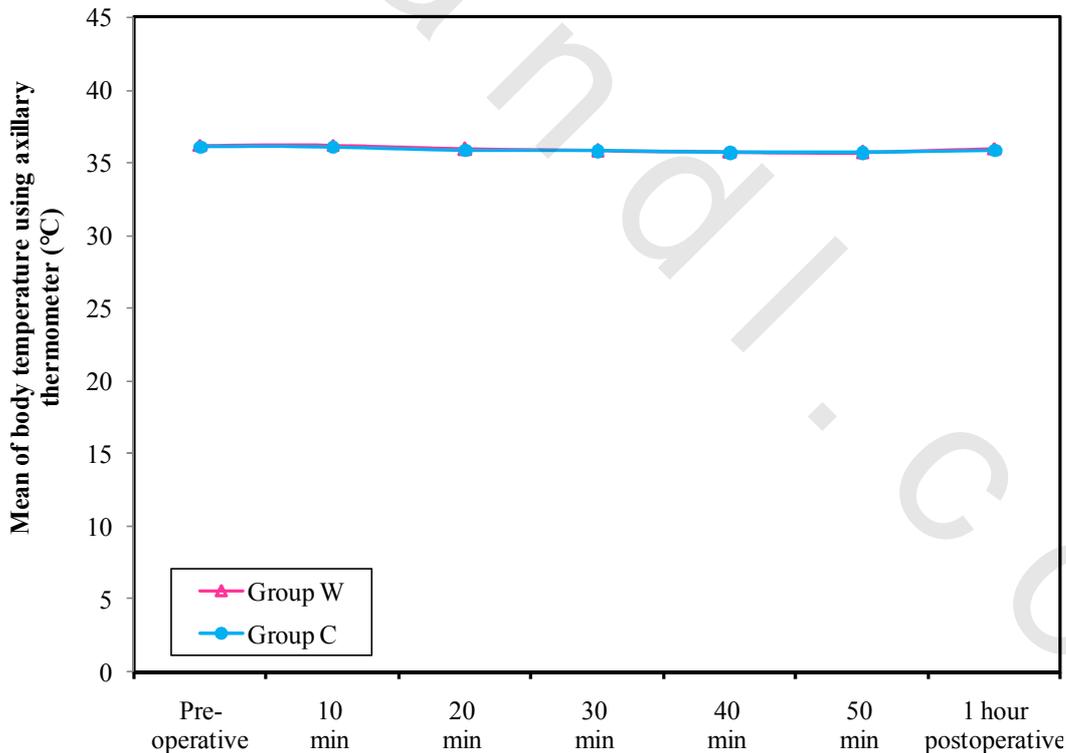
**Results**

**Table (XIV): Comparison between the studied groups according to body temperature (°C) using axillary thermometer:**

	Body temperature using axillary thermometer						
	Pre-operative	10 min	20 min	30 min	40 min	50 min	1 hour postoperative
<b>Group W</b>							
Min.	35.90	35.80	35.60	35.50	35.50	35.40	35.70
Max.	36.90	36.80	36.60	36.50	36.50	36.40	36.60
Mean	36.20	36.20	35.92	35.79	35.76	35.68	35.97
±SD.	0.34	0.36	0.35	0.34	0.35	0.35	0.30
Median	36.10	36.10	35.80	35.60	35.50	35.50	35.80
<b>Group C</b>							
Min.	35.80	35.80	35.65	35.60	35.50	35.50	35.70
Max.	36.80	36.70	36.62	36.60	36.50	36.60	36.60
Mean	36.10	36.08	35.87	35.77	35.72	35.72	35.87
±SD.	0.36	0.34	0.35	0.30	0.37	0.41	0.29
Median	35.90	35.90	35.65	35.60	35.50	35.50	35.70
<b>t</b>	0.974	1.213	0.521	0.223	0.394	0.337	1.155
<b>p</b>	0.335	0.231	0.605	0.825	0.695	0.737	0.254

t: Student t-test

\*: Statistically significant at  $p \leq 0.05$



**Figure (12): Comparison between the studied groups according to body temperature using axillary thermometer (°C).**

**Changes in Core (tympanic) Temperature (°C): (Table XV, XVI and XVII. Figure 13)**

In group W, it was found that the mean of the core temperature, immediately before spinal anaesthesia, ranged from 36.0 -37.3 (°C) with a mean of 36.62 ±0.40 (°C) . 20 minutes after spinal anaesthesia, there was a significant decrease in the core temperature reached a mean of 36.44±0.35 (°C). Later on, all over the time periods of the study, there was a significant decrease in core temperature.

In group C, it was found that the mean of the core temperature, immediately before spinal anaesthesia, ranged from 36.30-37.30 (°C) with a mean of 36.60±0.36 (°C). 20 minutes after spinal anaesthesia, there was a significant decrease in the core temperature reached a mean of 36.38±0.35 (°C). Later on, all over the time periods of the study, there was a significant decreasing in core temperature.

Comparison between the two studied groups showed no significant differences at all the measured times.

**Table (XV): Changes in body temperature (°C) using ear thermometer in group W:**

Cases No.	Body temperature using ear thermometer						
	Pre-operative	10 min	20 min	30 min	40 min	50 min	1 hour postoperative
1	37.3	37.1	37.1	37.0	37.0	36.9	36.9
2	36.8	36.8	36.4	36.2	36.2	36.1	36.6
3	36.8	36.8	36.7	36.6	36.5	36.4	36.6
4	37	36.9	36.7	36.5	36.4	36.4	36.6
5	36.4	36.3	36.1	36.0	36.0	35.9	36.2
6	36.4	36.4	36.1	36.0	36.0	35.9	36.2
7	37.1	37.1	37	36.9	36.9	36.9	37.0
8	36.7	36.7	36.3	36.1	36.0	36.0	36.4
9	36.1	36.3	36.1	36.0	36.0	35.9	36.2
10	37.3	37.3	37	36.8	36.8	36.7	37.0
11	36.3	36.3	36.3	36.1	36.0	36.0	36.2
12	36.3	36.3	36.1	36.0	36.0	35.9	36.2
13	37.1	37.1	37	36.8	36.8	36.7	36.8
14	37.1	37.1	36.7	36.6	36.6	36.5	37.1
15	36	36.3	36.1	36.0	36.0	35.9	36.2
16	36.4	36.3	36.3	36.1	36.0	36.0	36.2
17	36.8	36.7	36.4	36.2	36.1	36.1	36.5
18	36.6	36.5	36.3	36.1	36.0	35.9	36.3
19	36.5	36.4	36.2	36.1	36.0	35.9	36.3
20	36.3	36.3	36.1	36.0	36.0	35.9	36.2
21	36.1	36.3	36.1	36.0	36.0	35.9	36.2
22	36.4	36.3	36.3	36.1	36.1	36.0	36.3
23	36	36.3	36.1	36.0	36.0	35.9	36.2
24	37	37	36.9	36.7	36.7	36.6	36.7
25	36.8	36.7	36.5	36.4	36.3	36.2	36.6
Min.	36.0	36.3	36.10	36.0	36.0	35.90	36.20
Max.	37.30	37.3	37.10	37.0	37.0	36.90	37.10
Mean	36.62	36.62	36.44	36.29	36.26	36.18	36.47
±SD.	0.40	0.34	0.35	0.34	0.35	0.35	0.30
Median	36.60	36.50	36.30	36.10	36.0	36.0	36.30
p		NS >0.05	<0.001*	<0.001*	<0.001*	<0.001*	0.002*

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between base line with each other period

\*: Statistically significant at p ≤ 0.05

**Results**

**Table (XVI): Changes in body temperature (°C) using ear thermometer in group C:**

Cases No.	Body temperature using ear thermometer						
	Pre-operative	10 min	20 min	30 min	40 min	50 min	1 hour postoperative
1	36.8	36.8	36.50	36.30	36.3	36.2	36.3
2	36.4	36.4	36.15	36.05	36.1	36.0	36.2
3	36.3	36.3	36.16	36.05	36.1	36.0	36.15
4	36.3	36.3	36.16	36.05	36.1	36.0	36.15
5	36.4	36.3	36.15	36.05	36.1	36.0	36.15
6	36.6	36.6	36.30	36.20	36.1	36.0	36.4
7	37.2	37.1	37.12	37.07	37.1	37.05	36.8
8	37.1	37	36.50	36.30	36.3	36.2	36.8
9	36.5	36.5	36.16	36.05	36.1	36.0	36.2
10	36.6	36.6	36.20	36.05	36.1	36.0	36.15
11	36.3	36.3	36.16	36.05	36.1	36.0	36.15
12	36.3	36.3	36.16	36.05	36.1	36.0	36.15
13	36.4	36.4	36.16	36.05	36.1	36.0	36.2
14	36.5	36.5	36.20	36.10	36.1	36.0	36.15
15	36.4	36.3	36.20	36.10	36.1	36.0	36.2
16	36.3	36.3	36.16	36.05	36.1	36.0	36.15
17	36.3	36.3	36.16	36.05	36.1	36.0	36.15
18	36.3	36.3	36.16	36.05	36.1	36.0	36.15
19	36.3	36.3	36.16	36.05	36.1	36.0	36.15
20	37.2	37.1	37.12	36.80	37.1	37.05	36.7
21	36.3	36.3	36.16	36.05	36.1	36.0	36.15
22	37.2	37.2	36.80	36.60	36.5	36.4	37.07
23	37.3	37.2	36.90	36.80	37.1	37.05	36.8
24	37.1	37.1	37.12	36.80	37.1	37.05	36.9
25	36.7	36.6	36.40	36.30	36.2	36.2	36.3
<b>Min.</b>	36.30	36.30	36.15	36.05	36.10	36.0	36.15
<b>Max.</b>	37.30	37.20	37.12	37.07	37.10	37.05	37.07
<b>Mean</b>	36.60	36.58	36.38	36.24	36.30	36.21	36.35
<b>±SD.</b>	0.36	0.34	0.35	0.31	0.37	0.39	0.30
<b>Median</b>	36.40	36.40	36.16	36.05	36.10	36.0	36.20
<b>p</b>		NS >0.05	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between base line with each other period

\*: Statistically significant at  $p \leq 0.05$

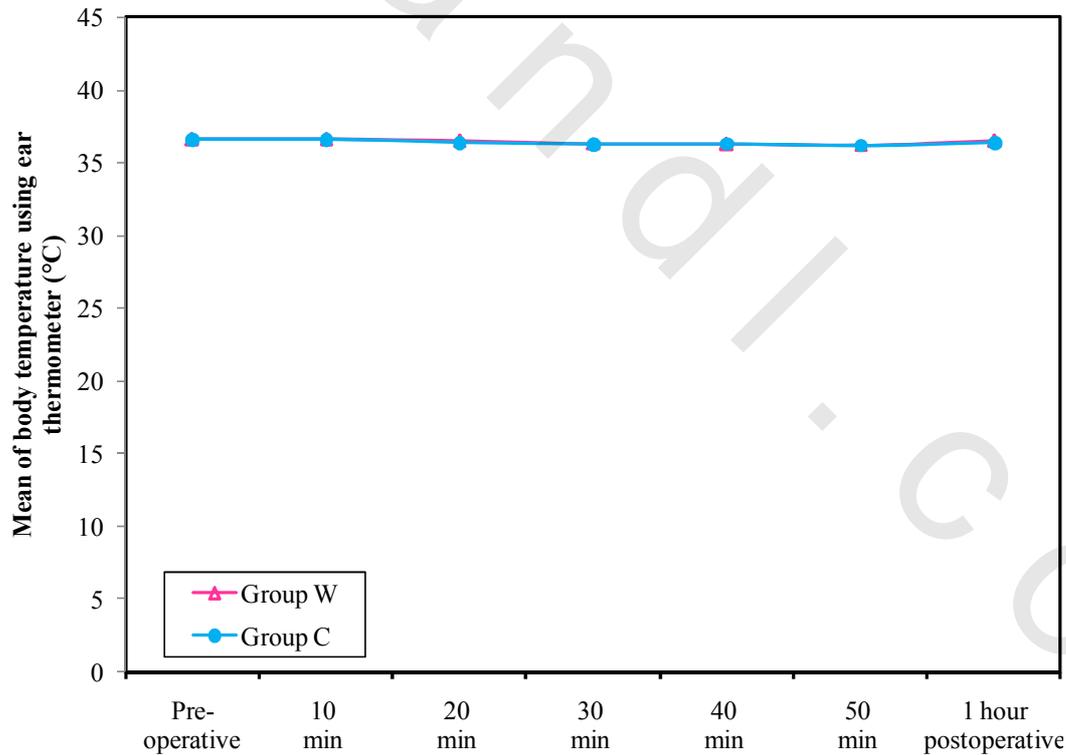
**Results**

**Table (XVII): Comparison between the studied groups according to body temperature (°C) using ear thermometer:**

	Body temperature using ear thermometer						
	Pre-operative	10 min	20 min	30 min	40 min	50 min	1 hour postoperative
<b>Group W</b>							
Min.	36.0	36.30	36.10	36.0	36.0	35.90	36.20
Max.	37.30	37.30	37.10	37.0	37.0	36.90	37.10
Mean	36.62	36.62	36.44	36.29	36.26	36.18	36.47
±SD.	0.40	0.34	0.35	0.34	0.35	0.35	0.30
Median	36.60	36.50	36.30	36.10	36.0	36.0	36.30
<b>Group C</b>							
Min.	36.30	36.30	36.15	36.05	36.10	36.0	36.15
Max.	37.30	37.20	37.12	37.07	37.10	37.05	37.07
Mean	36.60	36.58	36.38	36.24	36.30	36.21	36.35
±SD.	0.36	0.34	0.35	0.31	0.37	0.39	0.30
Median	36.40	36.40	36.16	36.05	36.10	36.0	36.20
<b>t</b>	0.185	0.498	0.605	0.537	0.395	0.269	1.428
<b>p</b>	0.854	0.621	0.548	0.594	0.695	0.789	0.160

t: Student t-test

\*: Statistically significant at  $p \leq 0.05$



**Figure (13): Comparison between the studied groups according to body temperature using ear thermometer (°C).**

**Shivering score: (Table XVIII, XIX, and XX. Figure 14)**

**In group W at different time intervals:**

**At 10 minutes after spinal anaesthesia:**

24% of patients experienced shivering grade (1) and 0% of patients experienced shivering grade (2,3).

**At 20 minutes after spinal anaesthesia:**

60% of patients experienced shivering grade (1) and 0% of patients experienced shivering grade (2,3).

At 30 minutes after spinal anaesthesia 88% of patients experienced shivering grade (1) and 12% of patients experienced shivering grade (2).

At 40 minutes after spinal anaesthesia 52% of patients experienced shivering grade (1) and 48% of patients experienced shivering grade (2).

At 50 minutes after spinal anaesthesia 32% of patients experienced shivering grade (1) , 52% of patients experienced shivering grade(2) and 16% of patients experienced shivering grade(3).

At 1 hour postoperative 32% of patients experienced shivering grade (1) and 60% of patients experienced shivering grade (2).

4 patients with grade 3 shivering in this group were given 25 mg meperidine IV.at 50 minutes after spinal anaesthesia.

**In group C at different time intervals:**

**At 10 minutes after spinal anaesthesia:**

52% of patients experienced shivering grade (1) and 0% of patients experienced shivering grade (2,3,4).

**At 20 minutes after spinal anaesthesia:**

80% of patients experienced shivering grade (1) and 20% of patients experienced shivering grade (2).

At 30 minutes after spinal anaesthesia 12% of patients experienced shivering grade (1) , 56% of patients experienced shivering grade (2) , 20% of patients experienced shivering grade (3) and 12% of patients experienced shivering grade (4) .

At 40 minutes after spinal anaesthesia 8% of patients experienced shivering grade (1) ,80% of patients experienced shivering grade (2) ,12% of patients experienced shivering grade (3).

At 50 minutes after spinal anaesthesia 4% of patients experienced shivering grade (1) , 72% of patients experienced shivering grade(2),24% of patients experienced shivering grade(3).

At 1 hour postoperative 60% of patients experienced shivering grade (1) and 24% of patients experienced shivering grade (2) and 0% of patients experienced shivering grade

## Results

(3,4). 17 patients with grade 3 and 4 shivering in this group were given 25 mg meperidine IV.(8 patients at 30 min,3 patients at 40 min and 6 patients at 50 min).

Comparison between the two studied groups showed significant differences at all the measured times with increase shivering score at group C.

**Table (XVIII): Changes in shivering score in group W:**

Cases No.	Shivering score						
	Pre-operative	10 min	20 min	30 min	40 min	50 min	1 hour postoperative
1	0	0	0	1	1	1	2
2	0	0	0	1	2	1	1
3	0	0	1	1	1	1	1
4	0	1	1	1	1	2	2
5	0	0	1	1	1	2	2
6	0	0	1	1	2	2	2
7	0	0	1	1	2	1	1
8	0	0	0	1	1	2	2
9	0	1	0	2	2	3	0
10	0	0	0	1	1	2	2
11	0	0	0	1	1	3	2
12	0	0	0	1	2	2	2
13	0	1	1	1	1	3	1
14	0	0	1	1	1	3	0
15	0	0	1	1	2	2	2
16	0	0	1	1	2	1	1
17	0	0	1	1	2	2	2
18	0	1	1	1	1	1	1
19	0	0	1	2	2	2	2
20	0	0	1	1	2	2	2
21	0	0	0	2	2	1	1
22	0	1	1	1	1	1	1
23	0	0	0	1	1	2	2
24	0	0	0	1	1	2	2
25	0	1	1	1	2	2	2
<b>0</b>	25 (100%)	19 (76.0%)	10 (40.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (8.0%)
<b>1</b>	0 (0.0%)	6 (24.0%)	15 (60.0%)	22 (88.0%)	13 (52.0%)	8 (32.0%)	8 (32.0%)
<b>2</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (12.0%)	12 (48.0%)	13 (52.0%)	15 (60.0%)
<b>3</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (16.0%)	0 (0.0%)
<b>Min.</b>	0.0	0.0	0.0	1.0	1.0	1.0	0.0
<b>Max.</b>	0.0	1.0	1.0	2.0	2.0	3.0	2.0
<b>Mean</b>	0.0	0.24	0.60	1.12	1.48	1.84	1.52
<b>±SD.</b>	0.0	0.44	0.50	0.33	0.51	0.69	0.65
<b>Median</b>	0.0	0.0	1.0	1.0	1.0	2.0	2.0
<b>p</b>		0.014*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

p: p value for Wilcoxon signed ranks test for comparing between Pre-operative and each other periods

\*: Statistically significant at  $p \leq 0.05$

**Results**

**Table (XIX): Changes in shivering score in group C:**

Cases No.	Shivering score						
	Pre-operative	10 min	20 min	30 min	40 min	50 min	1 hour postoperative
1	0	1	2	2	2	3	2
2	0	0	1	2	2	2	1
3	0	0	1	3	2	1	0
4	0	0	1	1	2	2	1
5	0	1	1	4	2	2	1
6	0	1	2	3	2	2	0
7	0	0	1	4	2	2	2
8	0	1	1	2	2	2	1
9	0	0	1	2	2	3	1
10	0	0	1	2	2	3	1
11	0	1	1	2	2	2	1
12	0	0	2	3	2	2	1
13	0	1	1	2	2	2	1
14	0	1	1	3	2	2	1
15	0	1	1	4	2	2	1
16	0	0	2	2	2	3	0
17	0	0	1	2	3	2	0
18	0	1	1	2	2	3	1
19	0	1	1	1	2	2	2
20	0	1	1	3	2	2	1
21	0	0	1	1	1	2	2
22	0	0	1	2	2	3	2
23	0	1	1	2	3	2	2
24	0	1	2	2	1	2	1
25	0	0	1	2	3	2	1
<b>0</b>	25 (100.0%)	12 (48.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (16.0%)
<b>1</b>	0 (0.0%)	13 (52.0%)	20 (80.0%)	3 (12.0%)	2 (8.0%)	1 (4.0%)	15 (60.0%)
<b>2</b>	0 (0.0%)	0 (0.0%)	5 (20.0%)	14 (56.0%)	20 (80.0%)	18 (72.0%)	6 (24.0%)
<b>3</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (20.0%)	3 (12.0%)	6 (24.0%)	0 (0.0%)
<b>4</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (12.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
<b>Min.</b>	0.0	0.0	1.0	1.0	1.0	1.0	0.0
<b>Max.</b>	0.0	1.0	2.0	4.0	3.0	3.0	2.0
<b>Mean</b>	0.0	0.52	1.20	2.32	2.04	2.20	1.08
<b>±SD.</b>	0.0	0.51	0.41	0.85	0.45	0.50	0.64
<b>Median</b>	0.0	1.0	1.0	2.0	2.0	2.0	1.0
<b>p</b>		<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

p: p value for Wilcoxon signed ranks test for comparing between Pre-operative and each other periods

\*: Statistically significant at p ≤ 0.05

**Results**

**Table (XX): Comparison between the studied groups according to shivering score**

	Shivering score						
	Pre-operative	10 min	20 min	30 min	40 min	50 min	1 hour postoperative
<b>0</b>	25 (100%)	19 (76.0%)	10 (40.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (8.0%)
<b>1</b>	0 (0.0%)	6 (24.0%)	15 (60.0%)	22 (88.0%)	13 (52.0%)	8 (32.0%)	8 (32.0%)
<b>2</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (12.0%)	12 (48.0%)	13 (52.0%)	15 (60.0.0%)
<b>3</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (16.0%)	0 (0.0%)
<b>Group W</b>							
Min.	0.0	0.0	0.0	1.0	1.0	1.0	0.0
Max.	0.0	1.0	1.0	2.0	2.0	3.0	2.0
Mean	0.0	0.24	0.60	1.12	1.48	1.84	1.52
±SD.	0.0	0.44	0.50	0.33	0.51	0.69	0.65
Median	0.0	0.0	1.0	1.0	1.0	2.0	2.0
<b>0</b>	25 (100.0%)	12 (48.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (16.0%)
<b>1</b>	0 (0.0%)	13 (52.0%)	20 (80.0%)	3 (12.0%)	2 (8.0%)	1 (4.0.0%)	15 (60.0%)
<b>2</b>	0 (0.0%)	0 (0.0%)	5 (20.0%)	14 (56.0%)	20 (80.0%)	18 (72.0%)	6 (24.0%)
<b>3</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (20.0%)	3 (12.0%)	6 (24.0%)	0 (0.0%)
<b>4</b>	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (12.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
<b>Group C</b>							
Min.	0.0	0.0	1.0	1.0	1.0	1.0	0.0
Max.	0.0	1.0	2.0	4.0	3.0	3.0	2.0
Mean	0.0	0.52	1.20	2.32	2.04	2.20	1.08
±SD.	0.0	0.51	0.41	0.85	0.45	0.50	0.64
Median	0.0	1.0	1.0	2.0	2.0	2.0	1.0
<b>Z</b>	-	2.019*	3.916*	5.298*	3.758*	2.030*	2.421*
<b>p</b>	-	0.043*	<0.001*	<0.001*	<0.001*	0.042*	0.015*

Z: Z for Mann Whitney test

\*: Statistically significant at  $p \leq 0.05$

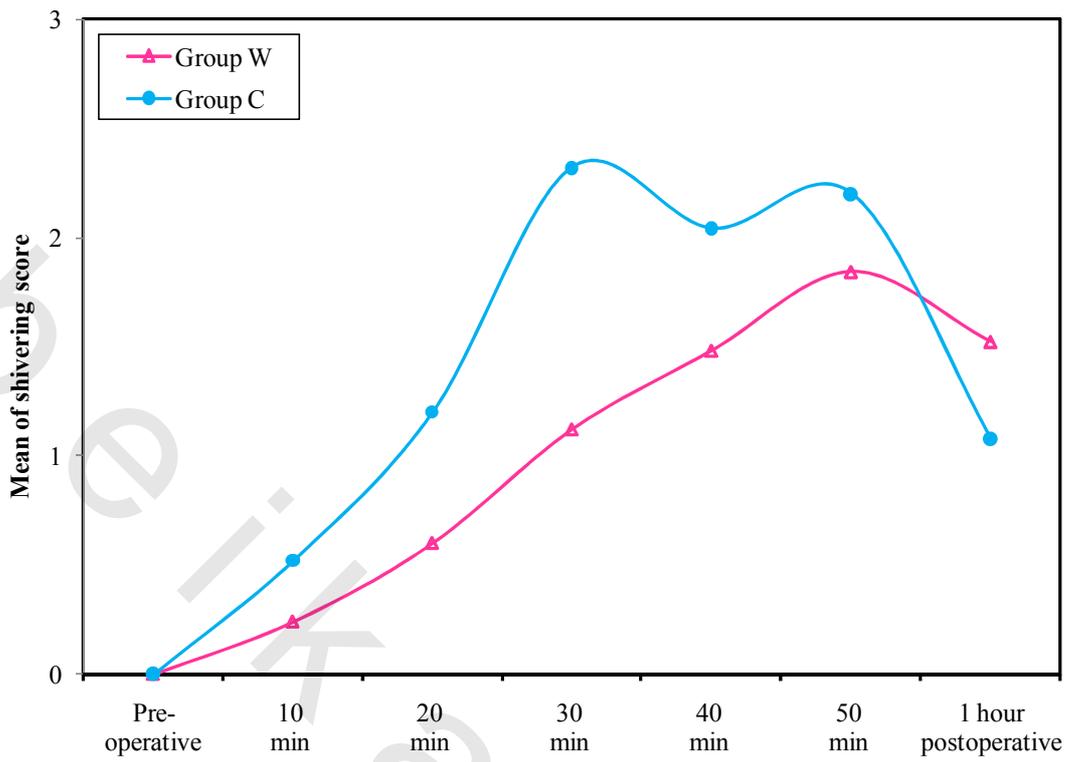


Figure (14): Comparison between the studied groups according to shivering score.