

Effect of Nursing-Led Interventions on Post Dural Puncture Headache among Cesarean Section Women with Spinal Anesthesia

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Abstract

The most common method of anesthesia for cesarean section is spinal anesthesia. Postdural puncture headache (PDPH) is the most common complication in spinal anesthesia after caesarean section of these complications. **The purpose:** To assess the effect of nursing-led intervention on postdural puncture headache among caesarean section women with spinal anesthesia.

Research Design: a quasi-experimental

Setting: Two setting in Menoufia University Hospital and Shebin Elkoom Teaching Hospital

Subjects: A non-probable sample of 200 women.

Instruments: Three instruments were used for data collection. A structured interviewing questionnaire. The second was grading of PDPH severity. The third was a structured pre-and post-spinal anesthetic nursing intervention.

Results there were significant difference between the study and control group regarding incidence and frequency of postdural puncture headache after caesarean section with spinal anesthesia and the study group complain less headache from the second day ($P < 0.0001$). Regarding the severity of PDPH in the control group there were 5 cases suffered from mild 17 case have moderate and 17 case have severe headache compared to study group were suffered from no sever pain and just seven have mild and 2 have moderate PDPH headache. The study group had no associated symptoms compared with the control group.

Conclusion: The study hypothesis was accepted as Nursing-led intervention reduce incidence and associated symptoms of postdural puncture headache among caesarean section with spinal anesthesia.

Recommendations: Generalize these nursing led interventions in hospitals to be included in the routine pre-operative and post-operative nursing care for mothers undergoing caesarean section with spinal anesthesia.

Key words: Nursing-Led Intervention, Post dural Puncture Headache, Cesarean section, Spinal anesthesia

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I. Introduction

Postdural puncture headache (PDPH) is one of the most recognized complications in women undergoing cesarean delivery, following spinal anesthesia. According to the International Tension Headache Society, the PDPH requirements include a tension headache that develops less than seven days after a spinal puncture, occurs or worsens less than fifteen minutes after assuming the upright position, and improves less than thirty minutes in the lying position with at least one of the following symptoms: neck stiffness, tinnitus, hypacusia, photophobia, and nausea. Post-Dural Puncture Headache is usually bifrontal and occipital, aggravated by movement of the head, upright posture and strain [1].

Nausea and vomiting are common symptoms that are preceded by PDPH, which can first occur several hours to days after the dural puncture. Recent publications have identified its incidences of around 15 % to 20 %. The symptoms generally improve slowly for time [2].

Dehydration, fasting, and probably related hypoglycemia, lack of caffeine intake, anxiety, and immobilization that contributes to muscle tension may contribute to PDPH [3]. The incidence of PDPH Increase with the presence of predisposing factors such as young age, past history, female sex, pregnancy, patient with low body mass index (BMI) and patient with high levels of stress during the procedure [3]. A number of factors, including dehydration, hormonal imbalance and high serum oestrogen affecting the tone of the cerebral vessels, have involved the high incidence of PDPH in the obstetric population. In addition to operating factors such as needle size, needle tip shape, dural fiber bevel orientation, number of lumbar puncture attempts, midline versus lateral lumbar puncture approach type of local anesthetic solution, and clinical experience of the operator [4].

PDPH nursing led care consists of preoperative psychological support and abdominal binders, as well

as oral or intravenous fluid replacement as indicated, coffee, early mobilization. Most of these tasks are mainly function for nurses. Coffee is known to be among the world's most widely used beverages [5]. Preoperative psychological support includes education about PDPH that it is a common iatrogenic complication, and the subsequent problems include the inability to perform daily activities, an extended length of stay (LOS) at hospital, and a higher visiting rate to the emergency room after discharge. All these will raise patients' anxiety to their possibly miserable experiences after spinal anesthesia, and the psychological stress will be exacerbated if PDPH eventually occurred. Therefore, psychological support will help PDPH patients more precisely understand that PDPH is a self-terminating process; active cooperation with clinicians will promote resolution; keep normal diet; and think solutions with faith but not with fear. So try to comfort or reassure PDPH patients psychologically will enhance their confidence to the treatments, and improve the outcomes [6].

Use of abdominal binder as a conservative treatment has been studied for patients with PDPH. It is mainly based on its transmission of pressure from increased abdominal cavity pressure to CSF pressure. Although this hypothesis is not supported by powerful evidence, and the CSF pressure may change along with the intra-abdominal pressure, the consequently increased CSF pressure at the early period of lumbar puncture would push more CSF out of the broken is uncertain. It has been suggested that PDPH would be less common if patients routinely had a rest period after a hard puncture, because about 1-70% of patients had postural headache after the puncture [7].

Oral or intravenous fluid replacement there is some evidence to support the use of oral or intravenous caffeine (300 mg to 500 mg in one L of intravenous fluid over one hour) for PDPH, but the main is prevent dehydration as also fasting before the operation may be contributing risk factor[8,9].

Bed rest though it is a time tested therapy, recent literature provides evidences against it. Bed rest after dural puncture did not reduce the risk of the occurrence PDPH, but rather there was trend towards enhanced headache in patients placed at bed rest. Coffee has the ability to control pain after spinal anesthesia, and to reduce it. It causes vasoconstriction in the cerebrum. Its enteral absorption within 30 minutes is rapid with a peak level. The recommended dose for PDPH is 300- 500 mg oral. One cup of coffee has about 50-100 mg of caffeine in it. Unpleasant effects have been shown to be related to heavy coffee consumption including restlessness, anxiety and increased blood pressure [10].

Pharmacological therapy includes symptomatic analgesics, medicines which increase the production of CSF. Paracetamol or anti-inflammatory medications which are not steroidal are used as first stage therapy. We also used vasoconstrictors such as caffeine. Analgesics Oral NSAIDs are often used for symptomatic relief and opioids such as codeine and tramadol. Methergin was found to be effective for PDPH following spinal anaesthesia in obstetric patients [11].

Significance of the study

PDPH is the third most popular reason for complaint in obstetrics against anesthesiologists. The regional anesthesia for elective caesarean section increased from 69.4% in 1992 to 94.9% in 2002, and spinal anesthesia accounted for 86.6% [12]. Review of the admission rate of patients to a university hospital in the Governorate of Menoufia during 2017 showed that over the past year, about 2000 cases required caesarean section under spinal anesthesia. Furthermore, about 80 percent of these patients complained of postdural puncture pain after spinal anesthesia, which impeded early recovery, feeding, and/or self-care. Consequently, these causes will hinder the healing process of their wounds, and the resulting financial burden on the mothers and their families, as well as the health care system. In addition, PDPH may offer mothers a bad experience with spinal anesthesia that makes them hesitant to use it again so the purpose of this study was to evaluate the effect of nursing led intervention on postdural puncture headache between cesarean section with spinal anesthetic.

Purpose of the study.

To assess the effect of nursing-led intervention on postdural puncture headache among cesarean section with spinal anesthesia

Research Hypotheses:

1. Cesarean section woman with spinal anesthesia who received nursing-led intervention will have less incidence of postdural puncture headache than who did not receive.
2. Cesarean section woman with spinal anesthesia who received nursing-led intervention will have less associated symptoms of postdural puncture headache than who did not receive

Subjects and Methods:

a) Research design:

A quasi experimental design.

b) Setting:

The study was conducted in two settings in Menofya governorate, namely Menofya University Hospital and ShebinElkoom Teaching Hospital. These settings were selected as the mentioned city is the governorate capital and known to have the highest population.

c) Sample

Non-probable sample was used as assigned to 2 groups, comprised of 200 (100 cases and 100 control) pregnant women. Participants were recruited according to the following inclusion criteria:

- 1- Voluntary confined women
- 2- Mothers aged 20 - 35 years old
- 3- who did not have any disease
- 4- Elective caesarean section.

Exclusion criteria were

- 1- Parturient with contraindication for spinal anesthesia,
- 2- History of migraine headaches,
- 3- Any obstetric complications,
- 4- Chronic use of analgesics.

The sample size was determined through the following procedure:

Flow rate in the study setting: the sample size was calculated to be 200 (100 for each group), considering CI=95% and power=90% (10% dropout).

D) Instruments of Data Collection

Instrument I: A structured Interviewing Questionnaire; this tool consisted of three parts

Part 1: Socio-Demographic Characteristics (Name, age, address, educational level, residence and occupation).

Part 2: Obstetrical History such as (Number of gravidity, parity, abortions, number of living children, outcomes of previous deliveries if present: (Number of normal vaginal deliveries, cesarean sections, Gestational age/weeks,).

Part 3: Risk factors of spinal anesthesia and associated symptoms related to postdural puncture headache. Duration, and associated symptom (nausea, vomiting, blurred vision and tinnitus). This tool was filled out for all patients in both groups three times per day during the five days following the operation.

Instrument II : Grading of PDPH Severity (Campbell *et al.*, 1993) [13]

<u>Grade</u>	<u>Criteria</u>
Mild	No limitation of activity No treatment required
Moderate	Limited activity Regular analgesics required Convenient treatment required
Severe	Confined to bed Anorexic Unable to feed baby Epidural blood patch required

Instrument III: a structured pre-and post-spinal anesthetic nursing intervention to be applied to the study group.

1. General pre and post anesthetic nursing care
2. Educational session about spinal anesthesia and PDPH prevention and treatment.
3. Increase hydration
4. Oral caffeine: one cup of coffee contains about 50-100 mg of caffeine daily.
5. Early ambulation after dural puncture is advisable and patients who have already developed PDPH should also be encouraged to ambulate as much as they can.
6. Application of abdominal binder.
7. NSAIDs as doctor order.

Validity and reliability for instruments I and II

Validity

The validity of the instruments was ascertained by a group of subject areas experts, medical and nursing staff who reviewed the instruments for content validity. They were asked also to judge the items for completeness and clarity. Suggestions were incorporated into the instruments.

Reliability

Test-retest reliability was applied by the researcher for testing the internal consistency of the instruments. It is the administration of the same instruments to the same participants under similar conditions on two or more occasions. Scores from repeated testing were compared.

Ethical Consideration:

Official steps were taken to obtain a permission to conduct the study, with explanation of the aim and the importance of the study to the centers authorities. An informed verbal consent was obtained from all students before participation in the study. Students were assure that their information were confidential and only used for study process. Also the students were informed that the collected data would be used only for the purpose of the present study, as well as for their benefit of the study.

8. One cup of coffee contains
9. about 50-100 mg of caffeine

Piloting study

The piloting was conducted on 20 mother to test the applicability of the instruments and to estimate the time needed for data collection. On the basis of the piloting results the researcher determined the feasibility of data collection procedures, developed an interview schedule. The results of the piloting help in refining the interview questionnaire.

Field Work

Preparatory phase (Nursing assessment):

The study protocol was approved and after explanation of its purpose an official permission was obtained from relevant authorities to carry out the study. Each patient had obtained an oral informed consent to participate in the study. Each individual was assured of confidentiality and privacy. The maneuvers of the study could not harm mothers. The collection of data has been expanded over a period of 6 months from December 2017 to July 2018. Available mothers who fulfilled the inclusion and exclusion criteria were assigned to intervention and control groups in an alternate manner.

The second steps:

Nursing Intervention

- The researchers started to collect the structured interview in the first 24 hours from admission which includes socio-demographic characteristics (Name, age, address, educational level, residence and occupation). Also obstetrical history such as (Number of gravidity, parity, abortions, number of living children, outcomes of previous deliveries if present: (Number of normal vaginal deliveries, cesarean sections, Gestational age/weeks,). Finally the risk factors of spinal anesthesia and associated symptoms related to postdural puncture headache. Duration, and associated symptom (nausea, vomiting, blurred vision and tinnitus).
- This instrument was filled out for all patients in both groups three times per day during the five days following the operation.
- The researchers designed a structured pre-spinal anesthetic nursing intervention to be applied to the study group.

The nursing intervention consisted of pre and post anesthetic measures.

- Psychological preparation and support to the patient through explaining what spinal anesthesia is, its importance, and correct position during lumbar puncture.
- Improvement of patient's hydration by encouraging patients to drink more fluids as juice, tap water, and/or soup.
- Taking two cups of coffee eight hours before the operation.
- Keeping the participants in prone position during period of rest and encourage early mobilization.
- Improving patient's analgesic as doctor orders.
- Application of an abdominal binder.
- While patients in the control group received the routine nursing measures.
- Pre-operatively and post-operatively anesthetic nursing measures were applied to the study group whereas the control group received the routine post-operative hospital measures.

Outcomes evaluation

Data were collected by researchers. The incidence, frequency and intensity of PDPH was assessed postoperatively. Using grading of PDPH severity scale immediately on either postoperative day (POD) until the end of follow up as the degree was pointed by the researcher every day. Need to analgesia were determined.

Statistical Data Analysis:

The data collected were tabulated & analyzed by SPSS (statistical package for the social science) software, statistical package version 20 on IBM compatible computer. Quantitative data were expressed as mean & standard deviation (X±SD) and analyzed by applying student t test for the comparison of two groups of normally distributed variables and two groups of not normally distributed variables by applying student t test for the comparison of two groups of normally distributed variables.

Qualitative data were expressed as number and percentage (No & %) and analyzed by applying chi-square test, and whenever testing proportions Z test was applied.

II. Result

Table (1) Sociodemographic characteristics of the study and control group.

Parameters	Group				X2	P- value
	Study (n=100)		Control (n=100)			
	No.	%	No.	%		
Age (years):						
20-25	55	55	52	52	1.6	0.31
26-30	45	45	48	48		
Range	20-30		20-30			
Mean ±SD	24.6±5.9		23.8±7.1			
Parity						
Primipara	57	57	49	49	1.82	0.091
Multipara	43	43	51	51		
Mean ±SD	2.3±1.2		3.6±2.1		2.8	0.064 >0.05

Table (1) shows, that the mean ages of the study group 24.6±5.9 and the control groups the mean ages 23.8±7.1. The mothers in the study and the control groups had similar demographic characteristic with no significant difference regarding age and parity.

Table 2 Incidence of Postdural Puncture Headache in Relation to Different Risk Factors among Study and Control Group.

Parameters	Group				X2	P- value
	Study (n=100)		Control (n=100)			
	No.	%	No.	%		
Risk factors						
Recurrent Tension headache	46	46	30	30	2.7	0.1
Abdominal surgery by spinal	14	14	20	20		
Height						
Range	150-178		150-180		0.89	0.3
Mean ±SD	161±11.4		163.2±12.4			
Weight						
Range	55-85		50-90			
Mean ±SD	63.5±11.3		64.5±12.2			
Needle type, n(%)						
25 G Whitacre	48 (33)	48	44	44	2.33 (8.36)	0.882 (0.032)
27 G Spinostar	52 (67)	52	56	56		
Repeated puncture attempt	22	22	18	18	2.92	0.095
Previous spinal anesthesia	30	30	26	26		

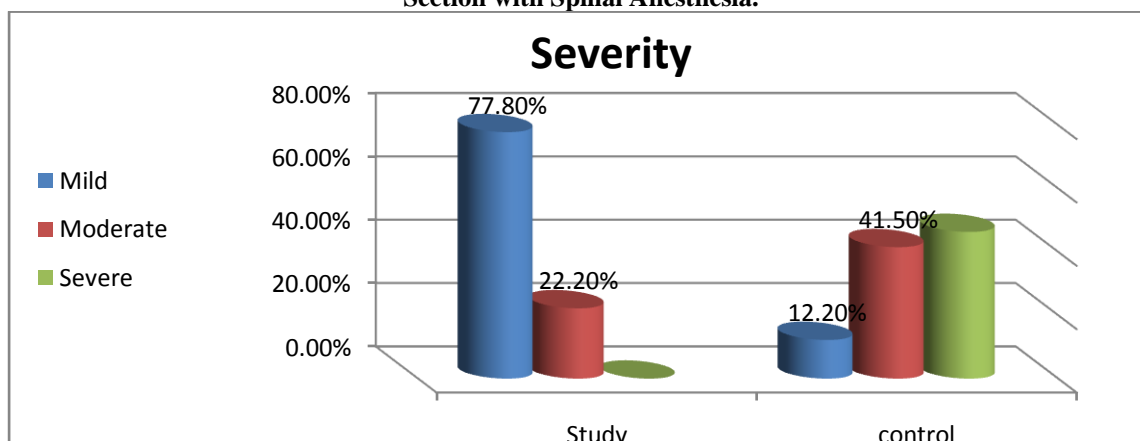
Table 2 revealed incidence of postdural puncture headache in relation to risk factors in the study and control group that there were statistically significance difference regarding size of needle size, repeated puncture and history of previous spinal anesthesia. It was noticed that occurrence of postdural puncture headache was decreased in cases that were handled by 27 G Spinostar needle in both group but it is minimized in use because it needs more experience and too thin.

Table 4: Post Intervention Distribution of Incidence, and Frequency of Postdural Puncture Headache among the Study and Control Group after Caesarean Section with Spinal Anesthesia.

	Groups				X2 Test	P- value
	Study(n=100)		control(n=100)			
	No.	%	No.	%		
Start						
None	20	20	7	7	6.2	0.6
Day.1	60	60	54	54		
Day. 2+	9	9	41	41		
Mean±SD	38.1±0.4		33.8±88			
End:						
None	20	20	8	8	25.6	0.002
Day.1	54	54	6	6		
Day. 2+	9	9	27	27		
Duration (hours):						
Range	0-168		0-168		25.8	0.0001
Mean±SD	22.1±30.6		111.2±53.8			

This table revealed that there were significant difference between the study and control group regarding incidence and frequency interpreted intostart to end and durationof the PDPH headache after caesarean section(P 0.0001). In addition the result of the current study revealed that the study group complain less headache from the second day.

Figure 1: Severity of Postdural Puncture Headache among the Study and Control Group after Caesarean Section with Spinal Anesthesia.



In relation to the figure shows the severity of PDPH as there were statistically significance difference as the control group were 5 cases suffered from mild ,17 have moderate and 17 have severe headache compared to study group were suffered from no sever pain and just seven have mild and 2 have moderate PDPH headache.

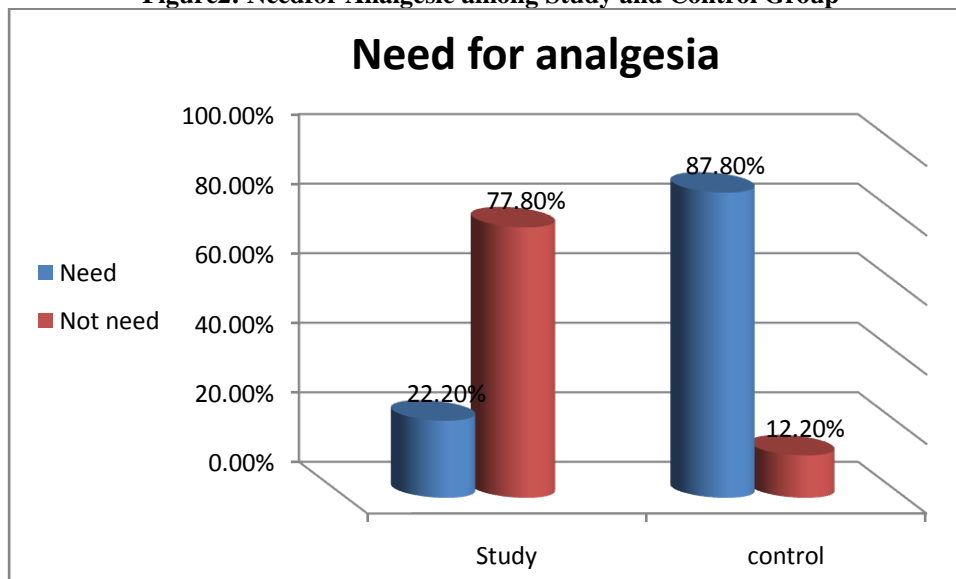
Table 5 Symptoms Associated with Postdural Puncture Headache among Cesarean Section after Spinal Caesarean Section

Parameters	Group				X2 Test	P- value
	Study (n=100)		Control (n=100)			
	No.	%	No.	%		
Day 1 (associated symptoms are nausea, vomiting, blurred vision and tinnitus)						
None	48	100	0	0	28	0.002
One	0	0	28	38.9		
Multiple	0	0	44	61.1		
Day 2						
None	20	100	0	0	23.8	0.001
One	0	0	8	66.6		
Multiple	0	0	4	33.3		
Day 3					26.3	0.000

None	24	100	0	0		
One	0	0	24	30.8		
Multiple	0	0	54	69.2		
Day 4					21.4	0.000
None	4	100	0	0		
One	0	0	20	36.4		
Multiple	0	0	35	63.6		
Day 5					20.9	0.000
None	4	100	0	0		
One	0	0	20	38.5		
Multiple	0	0	32	61.5		
Follow-up:					19.3	0.000
None	12	100	0	0		
One	0	0	12	16.7		
Multiple	0	0	60	83.3		

Tables (5) shows that there were statistically significant difference between the study and the control group regarding start, end and duration of the tension headache after caesarean section (p 0.000). The current study also revealed that the study group had no associated symptoms compared with the control group that is indicating the importance of the current study.

Figure2: Need for Analgesic among Study and Control Group



This figure represents need for analgesic among study and control group as just over a fifth of the study group (22.2%) in need to analgesic compared to a very large majority of control group (87.8%) that were in need to analgesic.

III. Discussion

Obstetric patients are particularly at high risk of PDPH due to their age and sex. From this aspects our study aims to assess the effect of nursing-led intervention on postdural puncture headache among cesarean section with spinal anesthesia.

Regarding to Sociodemographic data of the study and control group the study results revealed that the mean ages of the study group was 24.6 ± 5.9 and the control groups the mean ages was 23.8 ± 7.1 . The mothers in the study and the control groups had similar demographic characteristic with no significant difference regarding age and parity. This results were agreed also by [14] who were studying the effect of coffee consumption on the incidence of Post Dural Puncture Headache among patients receiving spinal anesthesia. The researchers reported that there were no statistical significant differences between study and control groups regarding patients' demographic and clinical data; age, marital status, level of education, occupation, body mass index, smoking and intra-operative monitoring. In the same line there was an increased incidence of PDPH in age group of 20–40 years in study by [15]. Their study titled "Incidence and management of post-dural puncture headache following spinal anaesthesia and accidental dural puncture from a non-obstetric hospital: A retrospective analysis" This results were supported also by [16] who studied postdural lumbar puncture

headache after spinal anesthesia for cesarean section in Egypt. They reported that there were no statistically significant difference between both groups in their study regarding to mean age, BMI, parity and gestational ages but there is difference in groups age as their group age were selected to be between 30 and 40 years because many studies reported that PDPH is more frequent in patient age group 18 -30 and less frequent in old ages due to atherosclerosis or age- related mechanical changes in the epidural space. Their exclusion criteria regarding to age is our inclusion criteria which we aimed to study cases suffering from PDPH.

Regarding to incidence of postdural puncture headache in relation to risk factors in the study and control group that there were statistically significance difference regarding size of needle size, repeated puncture and history of previous spinal anesthesia. It was noticed that occurrence of postdural puncture headache was decreased in cases that were handled by 27 G Spinostar needle in both group but it is minimized in use because it needs more experience and too thin. This also represented by [4]. Their study titled "assessment of risk factors for postdural puncture headache in women undergoing cesarean delivery in Jordan .The researchers concluded that the major risk factors associated with the incidence of PDPH in women undergoing cesarean delivery in Jordan are repeated puncture attempt and presence of tension headache. Risk factors included in his study were age, weight, occurrence of spinal headache, needle type, repeated puncture attempt, previous history of spinal anesthesia and PDPH, presence of preeclampsia, migraine, and sinusitis. As evidenced also by the study of [16,17] were reported that the same risk factors in their study. Now days there is smaller sizes needles (25- 27 gauge) which was used by to abolish the effect of needle size on the incidence of PDPH.

Regarding to incidence and frequency of postdural puncture headache among the study and control group after caesarean section with spinal anesthesia. That there were significant difference between the study and control group regarding incidence and frequency interpreted intostart to end of the tension headache after caesarean section. In addition the result of the current study revealed that the study group complain less headache from the second day but start were similar. This result were opposite to [1] who studied the effect of pre and post nursing intervention on the occurrence of tension headache among surgical patients undergoing spinal anesthesia. The time of start of the PDPH was not significantly different between the study and control group patients in her study. In both groups, about half of the patients experienced tension headache by the first day, and this increased to about 70% and 90%, respectively in the second day. Improvement started after the second day in the study group. From the researcher point of view this may be due to relying only on hydration on their study. But it is the matching by the end of nursing intervention as the structured nursing measures the researcher give before and after the procedure was successful in decreasing the incidence and duration of this tension headache and its associated symptoms.

Regarding frequency of postdural puncture headache this figure represents that almost of the study group (91%) had no postdural puncture headache compared to two thirds in the control group (59%). In relation to the severity of headache there were statistically significance difference as the control group were suffered from moderate and severe headache 41.4% and 46.3% respectively however study group were suffered from no sever pain and just mild to moderate headache 77.8% and 22.2% respectively. [16] they exhibit that the severity of PDPH was ranged between mild to moderate, only one case in study group was in severe form. Also [14] reported that degree of pain, after 4 hours and fourth day postoperatively no patients in the study group experience any pain compared with (66.7% and 100.0%) of patients in the control group experience moderate and mild degree of pain respectively.

With regard to the severity of tension headache, the present study findings point to significantly lower intensity scores among patients in the study group as compared to those in the control group. This can also be attributed to the effect of providing pre-and post-anesthetic nursing-led measures for patients in the study group, which might have a positive effect on reducing the severity of postdural puncture headache. [15] Reported that there are no strong clinical recommendations on how to avoid PDPH after ADP but PDPH has in principle a self-limiting course [12]. Given a conservative approach in the form of rest, good hydration and treatment of symptoms, over 50% of patients recover within 4 days. From the researchers' point of view, this finding could be justified that the present study verified that patients in control group had moderate degree of pain compared to mild degree of pain in study group. This result was supported by [18] who studied post duralpuncture headache and associated factors after spinal anesthesia among patients in University of Gondar Referral and Teaching Hospital, Gondar, North West Ethiopia reported that the majority of patients in their study have experienced mild (42.2%) and moderate (31.1%) PDPH pain.

The current study also revealed that associated symptomsshow statistically significant difference between the study and the control group regardingstart, end and duration of the tension headache after caesarean section. The current study also revealed that the study group had no associated symptoms compared with the control group that is indicating the importance of the current study. On the same line with [1] who reported that patients in the study and control groups also demonstrated statistically significant differences in the experience

of associated symptoms. As none of the patients in the study group had any of these symptoms. Compared to all of the patients in the control group had either one or multiple symptoms throughout the follow-up time.

Regarding to need to analgesia the results represents need for analgesic among study and control group as just over a fifth of the study group in need to analgesic compared to a very large majority of control group that were in need to analgesic. These findings reflects how many far the effect of nursing intervention on postdural puncture headache for cesarean section with spinal anesthesia. this were also in harmony with [19] who found that analgesic demand was significantly lower in study group for Post Dural Puncture Headache in young adult patients. This finding came in accordance with [15] exhibits that only 13.3% of patients in study group needed analgesic compared to 40% of patients in control group. Statistical significant difference as existed between the study and control groups. This result was point to effect of the effect of nursing-led intervention on postdural puncture headache among cesarean section with spinal anesthesia.

So from all of the above this was clear that cesarean section woman with spinal anesthesia who received nursing-led intervention have less incidence and less associated symptoms of postdural puncture headache than who did not receive.

IV. Conclusion

The study hypothesis was accepted as nursing-led intervention reduce incidence and associated symptoms of postdural puncture headache among cesarean section with spinal anesthesia.

V. Recommendation

- Generalize these nursing led interventions in hospitals to be included in the routine pre-operative and post-operative nursing care for mothers undergoing caesarean section with spinal anesthesia.
- Provide evidence based educational brochure to CRNAs and patients that explains proper positioning.

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