Patients' Common Associated Symptoms, Complications and Knowledge Post Lumbar Puncture

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Abstract

Background: Lumbar puncture is a common procedure used for regional anesthesia, and assist in diagnosis different disease, so the nurse play an important role in assess patients' knowledge regarding lumbar puncture, its symptoms and complications especially post lumbar puncture headache. **Aim of the study:** Assess common associated symptoms, complications and patients' knowledge regarding post lumbar puncture. **Research design:** A descriptive design was utilized to achieve the aim of this study. **Setting**: This study was conducted in general surgery, orthopedic, gynecology and urology departments at Zagazig university hospitals. **Subjects:** Purposive sample of (40) patients included from the above-mentioned setting from both sex. **Tools of data collections: Tool I:** Patient Interview Questionnaire to assess knowledge and complication for patients post lumbar puncture. **Tool II** : Tension Headache Dairy scale. **Results:** Revealed that, 52.5 % of studied patients their age ranged between 20-35 years, 100% of studied patients had incorrect answer about indications, possible complications and patients' positions during lumbar puncture, 90.0% had correct answer regard LP procedure was done when patient fasting, 77.5% of studied patients had unsatisfactory level of knowledge regarding lumbar puncture, 90% of studied patients had complications following the procedure that represented in nausea, vomiting and dizziness, 75% of studied patients complain of post lumbar puncture headache, and all the patients with post lumbar puncture headache complained of headache-associated symptoms that represented in nausea, vomiting, tinnitus, double vision and dizziness. **Conclusion**: overall, the study showed that more than three quarters of studied patients had unsatisfactory level of knowledge regarding lumbar puncture. Moreover, the most common symptoms and complications was headache associated with pain, nausea and vomiting, double vision, and tinnitus. **Recommendations:** The study recommended that patients should be given more knowledge on lumbar puncture to create a better awareness of its symptoms and complications.

Keywords: Common associated symptoms, Complication, Knowledge, Lumbar puncture,

Introduction

Lumbar puncture (LP) defined as insertion of hollow sterile needle into subarachnoid space of the spinal canal, usually inserted between 3rd and 4th or between 4th and 5th lumbar vertebra below the termination of the spinal cord[(1)].

Lumbar puncture can use in spinal anesthesia which is a commonly used technique for providing surgical anesthesia to patients undergoing urological, gynecological, and lower limb surgeries[(2)].

Lumbar puncture done to collect cerebrospinal fluid for laboratory analysis ,measure the pressure of cerebrospinal fluid (CSF), inject chemotherapy drugs or other medications, inject dye or radioactive substances used also to gathered information from a lumbar puncture can help diagnose a serious bacterial, fungal and viral infections[(3)].

The lumbar puncture is a relatively safe procedure, but minor and major complications can occur even when standard infection control measures and good technique are used. Common complications are post lumbar puncture headache (PLPH), nausea/vomiting, dizziness, CSF leakage, bleeding, subdural hematoma and lower extremity discomfort [(4)].

The International Headache Society (HIS) set criteria to identify the post lumbar puncture headache as a headache that develops within 5 days of LP and resolves within 1 week

spontaneously or within 48 hours after effective treatment. The headache usually worsens within 15 minutes after sitting or standing and disappears or improves within 15 minutes after lying down [5].

Lumbar puncture headache symptoms includes: Dull, throbbing pain that varies in intensity from mild to incapacitating and Pain that typically gets worse when you sit up or stand and decreases or goes away when you lie down. PLPH are often accompanied by: Dizziness, ringing in the ears (tinnitus), hearing loss, blurred or double vision, nausea and neck stiffness [6].

Post lumbar puncture headache are caused by leakage of spinal fluid through a puncture hole in the tough membrane (Dura mater) that surrounds the spinal cord. This leakage decreases the pressure exerted by the spinal fluid on the brain and spinal cord, which leads to a headache. It typically appears within 48 hours after a spinal tap or spinal anesthesia [7].

Lumbar puncture often causes anxiety and stress for patient. In order to minimize patients' discomfort and possible post lumbar puncture complications, the nurse should orient patient and their families about instructions regarding LP before, during, and after the procedure [8].

Nurses should understand that good adoption of knowledge to their practice is essential while caring for patients to prevent many complications and to provide high quality care. Nurses need for support and encouragement to transit their knowledge to care practices for professional nursing care for patients [9].

Before lumbar puncture, the nurse asks patient about his/her medical history, inform the patient that the procedure can assist in diagnosis, explain the procedure to the patient because many patient have misconception regarding LP. That interferes with anxiety and fear and allow time to verbalize concerns, explain how patient can cooperate in the procedure, obtain informed consent if required, perform a base line assessment of the lower limbs (strength, sensation and movement) [10].

The nurse instructs the patient to empty the bladder and bowels before procedure, ask the patient if he had allergy to any medications, taking blood-thinning or other anticoagulant medications. Teach the patient how to maintain the desired position during the procedure is important. Warn the patient that any movement during the procedure may cause injury to the spinal cord and its nerves. So, the patient should lie still during the procedure. The explanations must be given in simple language [11].

The nurse during LP procedure should stand near the patient, observing patient general condition and helping patient to maintain the desired position. If the patient cannot maintain the desired position, the nurse helps him. Instruct the patient to breathe quietly and not talk or cough during the procedure unless it is asked by the doctor. The patient's vital signs should be checked frequently during and after the procedure to detect the early signs of complications [12].

During lumbar puncture procedure, any patients` movement should be avoided to avoid nerve injury, administer prescribed sedation if required and reassurance may be helpful. Patients usually lies in lateral position, move back closed to edge of bed, draw knees toward chest as tight as possible and flex chin onto the chest. Nurses should follow sterile aseptic technique during procedure [13].

After LP procedure the nurse should monitor patients' vital signs. Position the patient flat. Maintain this position for 8 hr changing position is acceptable as long as the body remains horizontal. Any changes in the patient’s general condition should be reported immediately. Watch for

patient's color, pulse, respiration, blood pressure and other signs of complications such as nausea, vomiting, headache etc. If the patient develops PLPH, the following precautions are taken: darken the room, given plenty of oral fluids to re-establish the CSF level [14].

Administer analgesic, observe /assess the patient for neurological changes such as altered level of consciousness change in pupil's reports of tingling or numbness and irritability. Once the procedure is completed observe / assess the puncture site for bleeding, CSF leakage, or hematoma formation. Monitor for complication, especially increase intra cranial pressure (severe headache, nausea, vomiting, photophobia and change in the level of consciousness, encourage the patient to increase fluid intake. Provide drug for headache notify the physician if drug dose not relieve pain [15].

Aim of the study:

The current study aimed to assess common associated symptoms, complications and patients' knowledge regarding post lumbar puncture at Zagazig University Hospitals, Egypt.

Research Questions:

1- What are the patients' knowledge regarding post lumbar puncture?

2- What are the common associated symptoms and complications to patients post lumbar puncture?

Subjects and methods:

Research design:

A descriptive design was used

Study setting:

The current study was carried out in general surgery department, urology department, gynecology department and orthopedic department at zagazig university hospitals, Egypt.

Study subjects:

Purposive samples of 40 patients within 6 day post lumbar puncture excluded patients suffer from chronic headache for any reasons as (migraine, brain tumor, hypertension, meningitis, intracranial hemorrhages) and accepted to participate in the study. The sample size was calculate through Epi Info (Epidemiological information system) software version 6 according the following collected data ,the confidence level 95% and a power of study 80%.The estimated sample size was calculated to be 40 patients.

Tools of data collection:

Two tools were used to collect necessary data.

Tool I: Patient Interview Questionnaire. It adapted from **Khlebtovsky et al** [16] which divided in to four parts: **Part1: Patients' demographic characteristics:** involved five close end questions: Patient's age, sex, level of education, etc....

Part 2: Present and past medical history: Consisted of six questions concerned with the current medical diagnosis of patient and history of chronic diseases, patient suffered from headache before LP procedure in the last month and reason for current lumbar puncture and how dealing with headache.

Part 3: Patients' knowledge assessment Questionnaire: It was concerned with assessing patients' level of knowledge regarding lumbar puncture procedure. It included 12 questions. One Yes or No questions about instructions given / receive about LP, and by whom given and 11 MCQ about definition of lumbar puncture , its indications, and most common complications, characteristics of post lumbar puncture headache, , different positions, their knowledge regarding caffeine and fluid intake before and after the procedure, reliving and aggravating factors.

Scoring system of patient's knowledge: One given for each correct answer, while the incorrect answer zero given that made total score is 12. It considered that ≥ 50% was satisfactory level of patient knowledge and < 50% was unsatisfactory level of patient

knowledge based on statistical analysis.

Part 4: Complications assessment questionnaire: Consisted of seven questions to assess complications for patient after lumbar puncture procedure. Five MCQ questions about local Pain at needle insertion, and using blood patch after LP, and two Yes or No questions about current complication and post-lumbar puncture headache.

Tool II: An interview questionnaire to assess post lumbar puncture complications (Tension Headache Dairy): This tool written in Arabic language. It was used to assess post lumbar puncture complications and associated symptoms. It adapted from **Ahmed** [17].This tool included 17 questions. It was recorded daily by researcher immediately post LP and continued by telephone interview with the patients for six day after their discharge from the hospital. Two closed opened questions about onset and duration of headache. Two Yes or No questions concerned with assessing patients for presence or absence of warning signs (aura) and symptoms associated with headache, and 15 MCQ questions about location, and type of pain. Intensity of headache measured by numerical rating scale from 0 to 10 point which, a zero point indicate no pain, from 1 to 3 mild pain, from 4 to 6 moderate pain, from 7 to 10 severe pain[18].

Also, it used to assess patients for presence of other general symptoms as nausea, vomiting, neck stiffness, and dizziness. Ear related symptoms as tinnitus and hearing loss. Eye related symptoms as double vision, photophobia. It was also used to assess medication taken, sleeping hours after lumbar puncture procedure, medication taken and its effect on headache, how headache affecting patient DLA and identifying patient reliving and aggravating factors contribute to headache**.**

Scoring system: The scores of items included in this tool summed up and total scores divided in frequency and percentage.

Content validity & Reliability:

The tools were revised by a jury of five experts at faculty of nursing at Zagazig University, minor modification was done. Finally, the final forms were developed. The validity of this study range from (80-100) %. Reliability statistics of the study, the reliability of this tool was tested through measuring its internal consistency. In the current study, Cronbach's Alpha was 0.75.

Fieldwork:

Data collected in six months, from beginning of February 2020 to the end of July 2020. The researcher was available in the study settings for three days (Saturday, Monday and Wednesday) weekly. It took about 45 minutes to fill the lumbar puncture interview questionnaire. The researcher filled the interview questionnaire from patients before (in their care departments), after LP procedure (in operating room), and after surgery (in their care departments).

- Headache Tension Dairy tool used after LP procedure. It was recorded each shift in 1st day then daily for next 6th days. It recorded by the researcher from patients in the hospital and continued by telephone after patients discharged.

Pilot study:

A pilot study conducted to test feasibility and applicability of tools used in this study and as well as to estimate, the time needed to fill the tools. It carried out on five patients (10%). There was no modifications on tools after pilot study so that, the patients who included in the pilot study were excluded in the main study group.

Administrative and ethical considerations:

The research approval of protocol was obtained from scientific research ethical committee in faculty of nursing

at Zagazg University before starting the study, the researcher clarified the aim of the study to the patients included in the study, The researcher assured maintaining anonymity and confidentiality of the patients' data, subjects were informed that they allowed choosing to participate or not in the study and that, they had the right to withdraw from the study at my time without giving any reasons.

Statistical analysis:

The collected data were organized, tabulated and statistically analyzed using SPSS 23.0 for windows (SPSS Inc., Chicago, IL, USA 2011). Quantitative data were expressed as the mean ± SD & median (range), and qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). Continuous data were checked for normality by using Shapiro Walk test. Independent samples Student's t-test was used to compare between two groups of normally distributed variables. Percent of categorical variables were compared using Chi-square test or Fisher's exact test when appropriate. Kendall's correlation coefficient is a nonparametric measure of the strength and direction of association that exists between two variables measured on at least an ordinal scale. All tests were two sided. P-value < 0.05 was considered statistically significant (S), and p-value ≥ 0.05 was considered statistically insignificant (NS).

Results:

Among 40 patients, the mean age was 34.2±11.2 years**, (Table1)** shows that, 55% of studied patients were females, 52.5% of them had age range from 20 to 35 years, and 62.5% of studied patients were married, 55.0% had secondary educated and 37.5% were private sector employee. Means while, patient's BMI was 25.4±3.9 with range from 21.46 to 36.65,

Table 2 illustrates that; 27.5% of studied patients were smokers, at least four cigarettes per day, mean smoking duration 6.8±4.9 with range one to 15 years. Also less than half of them had chronic diseases (42.5%), hepatic disease (17.5%) followed by cardiac disease (15.5 %) were the most form to chronic disease,

Table3 illustrates that 95.5% of studied patients did lumbar puncture for anesthesia, 30%of patients suffered from headache last month and 20% had severe headache, 17.5 % had headache at front of head and treated with doctor consultant with only 12.5% of patients had recurrent episode of headache,

Table 4 shows a variability of correct answer about lumber puncture among studied patients regard knowledge items, which ranged from none had correct answer about indications, possible complications and patients positions during lumbar puncture to majority 90.0% of them had correct answer regard LP procedure was done when patient fasting. Generally less than quarter (22.5%) of patients had total satisfactory knowledge level about lumbar puncture,

Table 5 shows that 57.5% of studied patients suffer from post lumbar puncture site pain and 42.5% had mild pain. On the other hand, 90% of studied patients were suffered from post LP complication that represented in 55.0% nausea and vomiting, and 35% dizziness,

Table6 clarifies that occurrence of aura represent 10.0% of studied patients and all of them resolved from aura by fourth day, almost of the studied patients had associated symptoms represent in double vision, and tinnitus on the first days (96.7%, 96.7%) respectively with decline gradually to 20.0% and 30.0 % on the fourth days respectively. After that all studied patients cured from associated symptoms at sixth day with management,

Table 7 reveals that slightly more than three quarters 76.7% of studied patients who had post lumbar puncture headache intake NSAID at the first days and 73.3% at the second day, that decline to 66.7% at the third days

and 50% at the fourth day. 83.3% of them didn't need to take medication by sixth day. Regard factors relieve pain, 100.0%, 53.3%, 33.3% of studied patients reported that headache relieved by lying down, drink coffee, intake plenty fluid respectively and common aggravating factors were assume siting / standing position followed by loss fluid via vomiting and diarrhea (100 %, 76.7%) respectively in first and second day post LP,

Table 8 detects that there was a statistically significant relation between associated symptoms post lumbar puncture and studied patient's age p=0.0001. On other hand there was a statistically significant relation between associated symptoms post lumbar puncture and BMI of studied patients p=0.0001,

Table 9 shows that there were a statistically significant relation between associated symptoms post lumbar puncture and previous surgery, previous lumbar puncture and headache at previous lumber puncture (p = 0.009,0.009,0.024),

Table10 shows that, there was no statistical significant relation between total satisfactory knowledge level of studied patients and their post current lumber puncture complication,

Table 11 shows that, there was no statistical significant relation between total satisfactory knowledge level of studied patients and their demographic characteristics.

Discussion:

In relation to demographic characteristics, the results of the present study showed that, the mean of the studied subjects' age were 34.2±11.2. This finding showed near half of present studied subjects their age ranged between 20-35 years.

This finding was consistent with result that was reported by **Sjulstad et al** [19] who found in study "Occurrence of post dural puncture headache – A randomized controlled trial comparing 22G Sprotte and Quincke in Nordland Hospital, Norway, that the mean of studied patients' age were 37.7±12.0.

Concerning patient's level of education, the present study result showed that more than half of studied patient's level of education was secondary level .While; more than one quarter had higher education level. This explains deficit of studied patients' knowledge regarding the LP procedure, PLPH and aggravating and relieving measures.

This finding agreed with **Ahmed** [17] who stated in study titled "Factors Contributing to Headache and its Associated Symptoms for Post Lumbar Puncture Patients" where carried out in Egypt who illustrated that near half of studied subjects' level of education were secondary level and less than one fifth were read and write while, more than quarter were higher education level.

This finding contradicted with **Salah et a** [20] who stated in study titled "Effect of Pre-Discharge Instructions on Prevention of Headache and Its Associated Symptoms among Patients Undergoing Diagnostic Lumbar Puncture" where, conducted at lumbar puncture unit at hematology and hereditary department (medicine 12) affiliated at Ain Shams University Hospital, Egypt, that more than one sixth of study subjects were secondary level, less than quarter of them were university degree and more than half of them were read and write.

Regarding clinical data of patients under the present study, the results revealed that the mean of the studied patients' BMI was 25.4±3.9 with range from 21.46 to 36.65.

This finding was consistent with **Sjulstad et al** [19] who illustrated that the mean of the studied patients' BMI who had post lumbar puncture headache was 24.1± 5.0. This finding was inconsistent with **Song et al** [21] in study titled "Impact of Obesity on Post Dural Puncture Headache" where conducted at Montefiore Medical Center, New York which showed that more than half of studied subjects experienced post lumbar puncture headache with different BMI.

Regarding previous medical history of mild and chronic headache, the results showed that near half of studied patients developed headache at previous LP associated with other complications.

This finding agreed with that reported by **Khlebtovsky et al** [16] who stated in study titled "Risk factors for post lumbar puncture headache" where conducted in neurology department of a tertiary medical center , Israel, that the majority of their studied subjects has a history of PLPH.

This finding of current study was in contradicted with **Ahmed** [17] who illustrated that all patients who had previous medical history of mild, chronic headache developed PLPH.

Regarding level of patients' knowledge under the present study, the results of the current study indicated that more than three quarters of studied patients had unsatisfactory level of knowledge regarding lumbar puncture. This inadequacy of patients' knowledge may related to that the doctor hadn't give the patients enough instruction or information about indication of LP, patient position during LP procedure, possible complications after LP procedure, characteristic of PLPH, and its relieving and aggravating measures.

In the same line, this finding supported with **Scotton et al** [22] who indicated in study titled "Characterizing the patient experience of diagnostic lumbar puncture in idiopathic intracranial hypertension: a cross-sectional online survey" that the majority of studied subjects did not received adequate pre-procedural information, most of them developed the highest pain intensity, anxiety and discomfort during and after the procedure and others complications.

Concerning post lumbar puncture complications, the result showed that most of studied patients had complications following the procedure and more than half suffer from post lumbar puncture site pain.

This result was supported by **Ahmed** [17] who illustrated that that more than half of studied subjects had complications following LP procedure. This finding not supported with result that was reported by **Duits et al** [23]who, mentioned in study titled "Performance and complications of lumbar puncture in memory clinics: Results of the multicenter lumbar puncture feasibility study" In Amsterdam which reported that about third of patient complain of complications and nearly two third of those affected subjects had back ache or discomfort.

Concerning post lumbar puncture associated symptoms, the finding of the current study showed that all the patients with PLPH complained of headache-associated symptoms that represented in nausea, vomiting, tinnitus, double vision and dizziness.

This finding agreed with **Davoudi et al** [24] who reported in a study title " Effect of position during spinal anesthesia on post dural puncture headache after caesarian section: a prospective single –blind randomized clinical trial" which conducted in Hamedan university, Iran, that the majority of patients with PLPH complained of headache-associated symptoms that represented in nausea, vomiting, dizziness, double vision and tinnitus.

Concerning relation between associated symptoms post LP and patient's demographic characteristics, the findings of the present study revealed that there was a statistical significant relation between associated symptoms post LP and patient's age.

This finding agreed with **Salzer et al** [25]whose study titled "Prevention of post- dural puncture headache: A randomized controlled trial" which conducted in Danderyd Hospital, Sweden, revealed that there was a significant relation between associated symptoms post LP and age of subjects

Concerning relation between associated symptoms post LP and BMI, the finding of the present study revealed that there was a highly

significant statistical relation between associated symptoms post LP and subject's BMI.

This finding was agreed with **Sjulstad et al** [19] who revealed that there was a highly significant relation between associated symptoms post LP and subject's BMI even with, the overweight and obese patients experienced headache and this could be related to using large bore needle for the procedure.

There was disagreement with **Miu et al** [26] who reported in a study title "The relationship between body mass index and post –dural puncture headache in obstetric patients" which conducted in Australia, that there was no correlation founded between body mass index and the associated symptoms post LP.

Regarding relation between associated symptoms post LP and past surgical history of patients, the finding of the present study revealed that there was a highly statistical significant relation between associated symptoms post LP and previous surgery and previous LP.

This finding were in the same line with **Amorim et al**[27]who indicated that the risk of a new occurrence of associated symptoms post LP was 4.3 times greater in patients with a previous history of surgery.

Concerning relation between associated symptoms post LP and studied patient's total knowledge level, the finding of the present study showed that there was no statistical significance relation between associated symptoms post LP and patient's knowledge level.

This finding disagree with **Scotton et al** [22] who found that there was a significant relationship between associated symptoms post LP and studied patient's knowledge level.

Conclusion:

More than three quarters of studied patients had unsatisfactory level of knowledge regarding LP. While the highest knowledge given to the patients was regarding definition of LP, fasting before LP, patient position after LP and instructions about fluid and caffeine before and after LP procedure. Moreover, the most common symptoms and complications was headache associated with pain, nausea and vomiting, double vision, and tinnitus.

Recommendations:

In view of the study findings, the following recommendations are proposed:

- Developing a comprehensive booklet including basic information about symptoms, complications and knowledge post lumbar puncture.
- Continuous assessment of patient's before, during and after lumbar puncture by health care providers.
- The study should be replicated on large sample size and in different hospitals setting in order to generalize the results.

Table (1): Frequency distribution of demographic characteristics of studied patients (n=40)

Items	No.	%
Age per years		
<20	4	10.0
20-35	21	52.5
36-51	10	25.0
>51	5	12.5
Mean ±SD	34.2±11.2	
Median (range)	34(18-58)	
Sex		
Males	18	45.0
Females	22	55.0
Education		
Illiterate	4	10.0
Basic education	3	7.5
Secondary education	22	55.0
University education	11	27.5
Occupation		
Daily worker	6	15.0
government employee	8	20.0
Private sector employee	15	37.5
Free business	11	27.5
Marital status		
Un married	15	37.5
Married	25	62.5
BMI		
Mean ±SD	25.4±3.9	

Table (2): Selected habits and medical history of patient post lumbar puncture (n= 40)

Items	Yes		No	
	No.	%	No.	%
Sleeping hour before lumber puncture per day				
Mean ± SD	7.3±1.5			
Smoking	11	27.5	29	72.5
Number of cigrrrate per day				
Mean ± SD	10.8±6.4			
Range	4-20			
Duration of smoking per years				
Mean ± SD	6.8±4.9			
Range	1-15			
History of chronic disease	17	42.5	23	57.5
Types of chronic disease				
Diabetes	2	5	38	95.0
Hyperthyroidism	1	2.5	39	97.5
Cardiac	6	15.0	34	85.0
Hepatic	7	17.5	33	82.5
Cancer	1	2.5	39	97.5
Renal	3	7.5	37	92.5
Others	2	5.0	38	95.0

Table (3): Frequency distribution of headache at last month among studied patients (n= 40)

items	No.	%
Causes of current lumbar puncture		
Anesthesia	39	97.5
Draw CSF sample	1	2.5
Suffer from headache at previous month		
Yes	12	30.0
No	28	70.0
Causes of headache		
Do not know	2	5.0
Common cold	7	17.5
Teeth ache	3	7.5
Duration of headache per minute		
Mean ± SD (range)	46.4±17 (17-60)	
Intense of headache		
Moderate	4	10.0
Severe	8	20.0
Site of headache		
Front of head	7	17.5
Back of head	4	10.0
Right side	1	2.5
Management of headache		
Medication without doctor consultant	5	12.5
Medication with doctor consultant	7	17.5
Recurrent headache episode		
Yes	5	12.5
No	7	17.5
Number of headache episode at previous month		
Once	4	10
Two	1	2.5

Table (4): Frequency distribution of patient's knowledge regarding lumber puncture (n=40)

Items	Correct		Incorrect	
	No.	%	No.	%
Definition lumbar puncture	27	67.5%	13	32.5%
Indications of lumbar puncture	0	0.0	40	100.0%
Possible complications after lumbar puncture procedure	0	0.0	40	100.0%
Characteristics of post lumbar puncture headache	8	20.0%	32	80.0%
LP procedure performed when the patient fasting (eat , drink)	36	90.0%	4	10.0%
Patient view the lumber puncture procedure	22	55.0%	18	45.0%
Patients positions during lumbar puncture	0	0.0	40	100.0%
Patients positions after lumbar puncture	26	65.0%	14	35.0%
Instruction before lumbar puncture about amount of fluid and caffeine	30	75.0%	10	25.0%
Instruction after lumbar puncture about amount of fluid and caffeine	21	52.5%	19	47.5%
Relieving measures for headache after LP	2	5.0%	38	95.0%
Aggravating factors for headache after LP	9	22.5%	31	77.5%
Total knowledge score (12)*				
Satisfactory≥50%	9		22.5	
Unsatisfactory<50%	31		77.5	
Mean ± SD	4.5±1.4			
Range	2-8			

Table (5): Frequency distribution of post lumber puncture current complications among studied patients (n=40)

Items	No.	%
Post lumbar puncture site pain		
No	17	42.5
Yes	23	57.5
Degree of pain		
Mild pain	17	42.5
Moderate pain	6	15.0
Other complications		
No	4	10.0
Yes	36	90.0
Common complications		
Nausea and vomiting	22	55.0
Dizziness	14	35.0

Table (6): Frequency distribution of associated symptoms with headache among studied patients (n=30)

Items	1st day		2nd day		3rd day		4th day		5th day		6th day	
	No.	%	NO.	%	NO.	%	No.	%	No.	%	No.	%
Aura												
Yes	3	10.0	2	6.7	2	6.7	1	3.3	0	.0	0	.0
No	27	90.0	28	93.3	28	93.3	29	96.7	30	100.0	30	100.0
Nausea												
Yes	15	50.0	15	50.0	13	43.3	8	26.7	1	3.3	0	.0
No	15	50.0	15	50.0	17	56.7	22	73.3	29	96.7	30	100.0
Double vision												
Yes	29	96.7	26	86.7	18	60.0	6	20.0	0	0.0	0	.0.0
No	1	3.3	4	13.3	12	40.0	24	80.0	30	100.0	30	100.0
Tinnitus												
Yes	29	96.7	27	90.0	20	66.7	9	30.0	3	10.0	0	0.0
No	1	3.3	3	10.0	10	33.3	21	70.0	27	90.0	30	100.0

Table (7): Frequency distribution of headache relieving and aggravating factors among studied patients (n= 30)

Items	1st day		2nd day		3rd day		4th day		5th day		6th day	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Medication taken												
Acetaminophen	7	23.3	8	26.7	10	33.3	12	40.0	11	36.7	5	16.7
NSAID	23	76.7	22	73.3	20	66.7	15	50.0	3	10.0	0	.0
No	0	.0	0	.0	0	.0	3	10.0	16	53.3	25	83.3
Factors relief headache												
Lying down	30	100.0	30	100.0	30	100.0	30	100.0	30	100.0	30	100.0
Drink coffee	16	53.3	16	53.3	16	53.3	16	53.3	16	53.3	16	53.3
Analgesic	16	53.3	16	53.3	16	53.3	16	53.3	16	53.3	16	53.3
Intake plenty fluid	10	33.3	10	33.3	10	33.3	10	33.3	10	33.3	10	33.3
Factors aggravated headache												
Assume standing /Sitting position	30	100.0	30	100.0	30	100.0	27	90.0	13	43.3	6	20.0
Coughing / sneezing	1	3.3	1	3.3	1	3.3	0	.0	0	.0	0	.0
Fluid loss via Vomiting / diarrhea	23	76.7	23	76.7	12	40.0	9	30.0	2	6.7	0	.0
Fatigue / emotion	8	26.7	8	26.7	6	20.0	3	10.0	0	.0	0	.0

Table (8): Relation between associated symptoms post lumbar puncture and demographic characteristics of studied patients (n= 40)

Items	Associated symptoms				χ^2	p-value
	Yes n=30		No n=10			
	No.	%	No.	%		
Age per years						
<20	4	13.3	0	.0	26.6	0.0001*
20-35	21	70.0	0	.0		
36-51	5	16.7	5	50.0		
>51	0	.0	5	50.0		
Sex : Male	12	40.0	6	60.0	f	0.3
Female	18	60.0	4	40.0	f	0.3
Education						
Illiterate	3	10.0	1	10.0		
Basic education	2	6.7	1	10.0	0.44	0.93
Secondary education	16	53.3	6	60.0		
University education	9	30.0	2	20.0		
Occupation		.				
Daily worker	5	16.7	1	10.0		
Government employee	6	20.0	2	20.0	1.2	0.76
Private sector employee	12	40.0	3	30.0		
Free business	7	23.3	4	40.0		
Marital status						
Unmarried	11	36.7	4	40.0	f	0.99
Married	19	63.3	6	60.0		
BMI						
Normal	23	76.7	0	0	$\chi 2=22.7$*	0.0001*
Overweight	7	23.3	6	60.0		
Obese	0	0	4	40.0		

F=Fisher exact test χ 2 Chi square test * significant ($p < 0.05$)

Table (9): Relation between associated symptoms post lumbar puncture and past surgical history of patients (n=40)

Items	Associated symptoms				F p-value
	Yes (n=30)		No(n=10)		
	No.	%	No.	%	
Previous headache					
Yes	11	36.7	1	10.0	0.23
No	19	63.3	9	90.0	
Previous surgery					
Yes	21	70.0	2	20.0	0.009*
No	9	30.0	8	80.0	
Previous lumber puncture					
Yes	21	70.0	2	20.0	0.009*
No	9	30.0	8	80.0	
Headache at Previous lumber puncture					
Yes	19	63.3	0	.0	0.024*
No	2	6.7	2	20.0	

F=Fisher exact test *significant p<0.05

Table (10): Relation between total satisfactory knowledge level of studied patients and post lumber puncture complication (n=40)

Items	knowledge level				χ^2	p-value
	satisfactory≥50% (n=9)		Unsatisfactory<50% (n=31)			
	NO.	%	NO.	%		
Post complication current lumbar puncture						
Yes	6	66.7	24	77.4	f	0.67
No	3	33.3	7	22.6		
Pain at site of lumber puncture						
No	5	55.6	12	38.7	2.2	0.33
Mild pain	4	44.4	13	41.9		
Moderate pain	0	0	6	19.4		
Other complication						
No	0	0	4	12.9	1.5	0.48
Nausea and vomiting	6	66.7	16	51.6		
Dizziness	3	33.3	11	35.5		

χ^2 Chi square test f=Fisher Exact test non-significant p>0.05

Table (11): Relation between total satisfactory knowledge level of studied patients and their demographic characteristics (n=40)

Items	knowledge level				n.	χ^2	p-value
	satisfactory≥50% (n=9)		Unsatisfactory<50% (n=31)				
	n.	%	n.	%			
Age per years							
<20	0	.0	4	100.0	4		
20-35	7	33.3	14	66.7	21	3.5	0.32
36-51	1	10.0	9	90.0	10		
>51	1	20.0	4	80.0	5		
Sex							
Males	4	22.2	14	77.8	18	f	0.99
Females	5	22.7	17	77.3	22		
Education							
Illiterate	0	.0	4	100.0	4		
Basic education	0	.0	3	100.0	3	3.2	0.35
Secondary education	5	22.7	17	77.3	22		
University education	4	36.4	7	63.6	11		
Occupation							
Daily worker	0	.0	6	100.0	6		
Government employee	2	25.0	6	75.0	8	2.1	0.56
Private sector employee	4	26.7	11	73.3	15		
Free business	3	27.3	8	72.7	11		
Marital status							
Single	5	33.3	10	66.7	15	f	0.26
Married	4	16.0	21	84.0	25		
Source of information about LP							
Doctors	7	20.0	28	80.0	35	f	0.31
Nurses	2	40.0	3	60.0	5		

χ^2 Chi square test f=Fisher Exact test non-significant p>0.05

References:

1- Tortora, G. J. & Nielsen, M. Skeletal System: The Axial Skeleton. Principles of Human Anatomy, 14th edition: United States America, Wiley,2016, PP 206-208.

2- Shin, W., Kim, M. K., Kim, J., Woo, M. H., Cho, D. Y., & Lim, K. S. Post lumbar puncture headache: Case report of a serious adverse event in first-in-human study. *Transl Clin Pharmacol, 2017, 25*(4), PP 162-165. doi:10.12793/tcp.2017.25.4.162

3- Perry, A. G., Potter, P. A., & Ostendorf, W. *Nursing Interventions & Clinical Skills-E-Book*, Sixth edition. USA, Elsevier Health Sciences, 2015,PP 224- 225.

4- Li, J., Li, X., Tong, X., Liu, J., Huang, B., Chen, M. & Xu, D. Investigation of the optimal duration of bed rest in the supine position to reduce complications after lumbar puncture combined with intrathecal chemotherapy: a multicenter prospective randomized controlled trial. *Supportive Care in Cancer*, 2018, *26* (9), PP 2995-3002.

5- Olesen, J. Headache Classification Committee of the International Headache Society (IHS). The International Classification of Headache Disorders, Asbtracts. Cephalalgia, 2018, 38(1), PP 1-211.

6- Waldman, S. D. *Atlas of Uncommon Pain Syndromes E-Book*, Fourth edition. China, Elsevier Health Sciences, 2019, P 40.

7- Arnold, M. Headache classification committee of the international headache society (IHS) the international classification of headache disorders. *Cephalalgia ,2018, 38*(1), PP 1-211

8- Abdelmowla, R. A. A., Sayed, S. Y., & Elmagd, N. S. A. Lumbar Puncture: Nurses Knowledge, Practice and Patients' Satisfaction with Nursing Care. *American Journal of Nursing Science, 2017, 6*(5), P 433

9- Tarakcioglu Celik, G. H., & Korkmaz, F. Nurses' knowledge and care practices for infection prevention in neutropenic patients. *Contemporary nurse*,2017, *53*(2) , PP 143-155.

10- Van Leeuwen, A. M., & Bladh, M. L. *Davis's Comprehensive Manual of Laboratory and Diagnostic Tests with Nursing Implications*, 8th edition. Philadelphia, FA Davis,2019, 44, PP 297-298.

11- Ignatavicius, D. D., Workman, M. L., & Rebar, C. *Medical-Surgical Nursing-E-Book: Concepts for Interprofessional Collaborative Care*, Nine editions, Canada, Elsevier Health Sciences,2017, PP 842, 855-856.

12- Urden, L. D ،.Stacy, K. M., & Lough, M. E. *Critical Care Nursing-E-Book: Diagnosis and Management* , 8th edition . Canada ,Elsevier Health Sciences ,2017, P 567.

13- Pagana, K. D., & Pagana, T. J. *Mosby's Manual of Diagnostic and Laboratory Tests-E-Book* , Sixth edition .Canada , Elsevier Health Sciences, 2017, P 594.

14- Lister, S., Hofland, J., & Grafton, H. (Eds.). *The Royal Marsden manual of clinical nursing procedures*, Tenth edition. Great Britain, John Wiley & Sons, 2020 470, PP 693- 695.

15- Ignatavicius, D. D., & Workman, M. L. *Medical-Surgical Nursing-E-Book: Patient-Centered Collaborative Care*, 2015, 8th edition. Canada, Elsevier Health Sciences, P 847.

16- Khlebtovsky, A., Weitzen, S., Steiner, I., Kuritzky, A., Djaldetti, R., & Yust-Katz, S. Risk factors for post lumbar puncture headache. *Clinical neurology and neurosurgery*, 2015,*131*, PP 78-81

17- Ahmed, K.,M.,R,.Factors contributing to headache and its associated symptoms for post lumbar puncture patients, Master degree,Faculty of nursing ,Ain Shams Unveristy, Cairo,2019, PP 1-257.

18- Good, V. S., & Kirkwood, P. L. *Advanced Critical Care Nursing-E-*

Book, 2 ND editions. Canada, Elsevier Health Sciences, 2017, PP 353-354.

19- Sjulstad, A. S., Odeh, F., Baloch, F. K., Berg, D. H., Arntzen, K., & Alstadhaug, K. B. Occurrence of post dural puncture headache—A randomized controlled trial comparing 22G Sprotte and Quincke. *Brain and Behavior*,2020, *10* (12), PP 1-7.

20- Salah, M., Gomaa, N., Shehata, H., & Mahdy, N. E. S. Effect of Pre-Discharge Instructions on Prevention of Headache and Its Associated Symptoms among Patients Undergoing Diagnostic Lumber Puncture. *Journal of American Science*,2013, *9* (1), PP 255-250.

21- Song, J., Breidenbach, K., Penaco Duong, A. L., Zhang, S., & Joseph, V. Impact of migraine headaches and depression/anxiety on the incidence of post-dural puncture headache during postpartum course. *Australasian Medical Journal,2018, 11*(3), PP 178-187.

22- Scotton, W. J., Mollan, S. P., Walters, T., Doughty, S., Botfield, H., Markey, K., & Sinclair, A. J. Characterizing the patient experience of diagnostic lumbar puncture in idiopathic intracranial hypertension: a cross-sectional online survey. *BMJ open*, 2018, *8* (5), PP 1-7.

23- Duits, F. H., Martinez-Lage, P., Paquet, C., Engelborghs, S., Lleó, A., Hausner, L., & Tsolaki, M. Performance and complications of lumbar puncture in memory clinics: results of the multicenter lumbar puncture feasibility study. *Alzheimer's & Dementia*,2016, *12* (2), PP 154-163.

24- Davoudi, M., Tarbiat, M., Ebadian, M. R., & Hajian, P. Effect of position during spinal anesthesia on postdural puncture headache after cesarean section: a prospective, single-blind randomized clinical trial. *Anesthesiology and Pain Medicine*, 2016, *6* (4), PP 1-4.

25- Salzer, J., Granasen, G., Sundström, P., Vagberg, M., & Svenningsson, A. Prevention of post-dural puncture headache: a randomized controlled trial. *European Journal of Neurology*,2020, *27* (5), PP 871-877.

26- Miu, M., Paech, M. J., & Nathan, E. The relationship between body mass index and post-dural puncture headache in obstetric patients. *International journal of obstetric anesthesia*, 2014, *23* (4), PP 371-375.

27- Amorim, J. A., Gomes de Barros, M. V. & Valença, M. M. Post-dural (post-lumbar) puncture headache: risk factors and clinical features. Cephalalgia, 2012, 32(12), PP 916-923.