

## Effect of Pre-Discharge Instructions on Prevention of Headache and Its Associated Symptoms among Patients Undergoing Diagnostic Lumbar Puncture

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**Abstract:** Post lumbar puncture headache (PLPH) has been a problem for patients, following dural puncture. Headache after lumbar puncture is a common occurrence (32%) and carries a considerable morbidity, with symptoms lasting for several days, at times severe enough to immobilize the patient. If untreated, it can result in serious complications such as subdural haematoma and seizures, which could be fatal. The accompanying symptoms are usually nausea, vomiting and neck stiffness. Other nonspecific symptoms may occur such as ocular complaints as photophobia and diplopia, and auditory complaints like tinnitus and hyperacusis. PLPH typically manifests as a postural, frontal, front temporal, or occipital headache, worsened by ambulation and improved by assuming the lateral position, occurring within 48 hours after dural puncture. **Aim :** The aim of this study was to examine the effect of pre-discharge instructions on prevention of headache and its associated symptoms among patients undergoing diagnostic lumbar puncture **Subjects and Methods: Design:** A quasi experimental design was used. **Setting:** This study was conducted at lumbar puncture unit at hematology and hereditary department (medicine 12) affiliated to Ain Shams University Hospital. **Sample:** A purposive sample included 60 patients undergoing to diagnostic LP. **Tools for data collection:** The patient Lumbar puncture interview questionnaire (Pre and Post Lumbar puncture procedure), Headache Diary (Post Lumbar puncture procedure throughout seven days), Headache Impact Test™ questionnaire (HIT-6™) (Version 1.1) Post lumbar puncture procedure and LP patients perception sheet. **Results:** The intensity of the headache among the control group was higher compared to the study group with highly statistical significant difference from day two to seven day. Also, there was no statistically significant difference regarding total knowledge regarding PLPH and associated symptoms pre- instructions implementation, while there was an improvement with a highly statistically significant difference post instructions implementation. The impact of the headache on the control group higher than the study group with a highly significant difference between them regarding daily living activities. There was a significant difference between the personal characteristics and intensity of the headache between study and control group. **Conclusions:** The implementation of pre discharge LP instructions was effective in reducing the intensity of the PLPH and occurrence of associated symptoms. The pre discharge instructions had a positive effect in increasing the level of perceptions in the study group patients. **Recommendations:** It was recommended to use the Arabic Instructions in outpatients for patients undergoing lumbar puncture and further studies should be carried out on a large number of subjects for evidence of results and generalization. Also, further study is recommended to evaluate the association between post lumbar puncture headache and its associated factors.

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**Key words:** PLPH, Associated symptoms and perception.

### 1. Introduction

Lumbar puncture, also known as spinal puncture, involves passing a needle through the wall of the dural sac and into the subarachnoid space, which is filled with cerebrospinal fluid, in the lumbar portion of the back. This is normally done in connection with diagnostics to measure the pressure in the subarachnoid space, to analyze cerebrospinal fluid, to inject contrast medium for myelography or in connection with spinal anesthesia. Lumbar puncture may occasionally have a therapeutic purpose, for example in cases of idiopathic intracranial hypertension. The dural sac may also have a hole after epidural anesthesia/analgesia (Nor Legeforen, 2012).

Complications following lumbar puncture are numerous and can range from trivial to life threatening, including headaches lasting from 8 days to 1 year, prolonged backache, cranial neuropathies, nerve root injury, and meningitis Ghaleb (2010). Headache following lumbar puncture is a common and sometimes incapacitating syndrome that has been recognized for approximately 100 years. In 1898 August, Bier was the first to report on post lumbar puncture headache (PLPH) after he and his associates underwent lumbar puncture themselves and experienced headaches first-hand. Bier postulated that PLPH was caused by leakage of cerebrospinal fluid

(CSF) through the puncture in the dura mater caused by the needle. This belief is maintained today; it is supposed that CSF leakage through the dural rent made by the LP needle exceeds the rate of CSF production, resulting in low CSF volume and pressure (Lavi et al., 2006).

According to the **International Classification of Headache Disorders (ICHD-II)**, the post-dural puncture headache is iatrogenically conditioned orthostatic headache caused by low pressure in the spinal fluid space. It is worth noting that these headaches can occur considerably later than five days after a lumbar puncture, and that at worst the condition may last for months and even years (**Headache Classification Subcommittee of the International Headache Society, 2004 & Baerentzen and Mathiesen, 2007**). Characteristically, the headache, which can begin within hours, typically starts 24 to 48 hours after dural puncture. It is usually frontal or occipital and often radiates to the nuchal area and behind the eyes (Armon and Evans, 2005). It is postural, mostly severe when the patient is upright, and subsides when the patient is recumbent (Kleinman and Mikhail, 2006). The intensity of PLPH varies from mild to severe, with severe headache being more common. It is described as pressure-like pain with occasional throbbing, pounding, or a dull, aching quality. The headache intensifies within 15 minutes of the patient sitting or standing up from a recumbent position, and abates within 15 minutes of the patient lying down. Occasionally, the associated symptoms may include nausea, vomiting, dizziness, tinnitus, and visual changes as diplopia may occur. The headache is usually self limited, resolving within days to weeks (the mean duration four days). This patient associated symptoms, normal neurologic findings and occurs are most consistently with post lumbar puncture headache. Without treatment, the headache typically lasts 2 to 14 days (average four to eight days) (Desai et al., 2010).

The risk of developing a headache as a result of a lumbar puncture depends on a number of factors, and the incidence will therefore vary widely, depending on the populations studied and the needles and techniques that have been used. The diameter, or gauge (gg), of the lumbar puncture needle, and the shape of the point appear to be the most important individual factors with a bearing on the incidence (Bezov, et al., 2010). Several types of needles are used for lumbar puncture, including Quincke, Whitacre, Sprotte, and Atraucan needles. Needles can be classified as "cutting" (ie, Quincke needle) or "a traumatic" (ie, Whitacre, Sprotte, Atraucan needles). Several studies have shown that the frequency of PLPH is lower with the use of a traumatic needles, particularly the Sprotte needle, as compared with the Quincke needle (Lavi et al., 2010). The incidence of PDPH can be as high as

80% if puncture occurs with a 16 G needle. But within the last 17 years more refined and thinner needles of 24 G to 28 G have been used more often and the incidence of PDPH is grossly reduced to less than 3 to 5% (L'ubusky, et al., 2006, Nafu et al., 2007 & Lomax and Qureshi, 2008).

The possible risk factors that could be unmodified in order to reduce the frequency of post-lumbar puncture headache include, demographic risk factors for such headaches, including younger age greatest in those 18-30 years of age. Female gender twice as often; and headache before or at the time of the lumbar puncture. Lower body weight and previous post-lumbar puncture headache were less certain risk factors. Also, there were identified number of technical factors that may be helpful in reducing the incidence of post-lumbar puncture headache, including, needle size, needle design, replacing stylet before withdrawing the needle and direction of bevel (Shah and Thomas, 2007).

The prevention, the recognition and treatment of adverse effects are the role of the entire health care team that cares for patients who require lumbar puncture. As such, implications for the role of nursing are essential before, during, and after a lumbar puncture. Traditionally, bed rest position after LP, using smaller needles or blunt needles has been used to prevent post LP headache. Also it is recommended that patients relax before the procedure to release any muscle tension, since the lumbar puncture needle must pass through muscle tissue before it reaches the spinal canal. A patient's level of relaxation before and during the procedure plays a critical role in success. Relaxation may be difficult for those patients who face frequent lumbar punctures, such as patients with leukemia. In these cases, it is especially important for the patients to receive psychological support before and after each procedure (Wu et al., 2006).

The first line of treatment is recumbency, hydration, an elastic abdominal binder, mild analgesics, and caffeine. If post-LP headache persists after a day of such treatment, an epidural blood patch is usually effective (Kim et al., 2012). A blood patch may also be effective for spontaneous or traumatic CSF leaks, which rarely require surgical closure (Chen et al., 2007). While, oral and intravenous administration of caffeine has been recommended as a therapeutic option for post-LP headache. It is causing the vascular system in the brain to constrict resulting in decreases in cerebral blood inflow and blood volume in the brain. Drink caffeinated drinks, such as coffee or soda, every 4 to 6 hours. If this does not relieve the headache, the patient may need to be given caffeine intravenously (Halker et al., 2007). Epidural Saline is another method of treating these headaches. Other conservative measures as tight abdominal binder as

well as the prone position causes increased intra abdominal pressure which may result in an increase in CSF. This method is very uncomfortable and is rarely used in modern practice (**Chohan and Hamdani, 2003**).

Bed rest is advised simply to lessen the severity of symptoms. But bed rest is no longer advised unless symptoms occur. When symptoms occur, the patients are often at bed rest since it is the only way that they can obtain relief (**Tejavaniya et al., 2006**). For a mild PDPH, NSAIDs are often prescribed. For severe headaches, NSAIDs may not be sufficient, and narcotics may be necessary in the initial period. Epidural morphine has been shown to be effective, but is usually not a convenient treatment for an outpatient or a patient waiting to be discharged. Lateral horizontal position produces less tension on the dural tent than supine, and results in less leakage of CSF. Meanwhile, the concept of hydration for a PDPH is often misunderstood. The purpose of the oral hydration as water, milk, and juices is to ensure that the rate of CSF production is appropriate (**Zencirci, 2010**).

Although the degree of CSF leak does not correlate with the severity of the symptoms in a PDPH, it is assumed that improvements in the ratio of CSF production to CSF leak will improve the clinical picture. Dehydration can result in a decrease in CSF production. However, if someone is appropriately hydrated, and the rate of CSF production is normal, there is no evidence that over hydration will increase the rate of CSF production any further. Therefore, there is no point in administering fluids to a patient who is already appropriately hydrated (**Frank, 2008 ; Majd et al., 2011**).

Although PDPH is a self limiting and nonfatal condition, its postural nature prevents the patient from performing routine activity and many make them anxious and depressed. Therefore these patients require psychological support and a lot of reassurance in addition to therapeutic measures (**Vilming and Mokri, 2006**). So, the nurse give the patient information and helping them to understand, cope with and take control of their disease to psychological support, rapport-building, reassurance, empathy and promoting self-esteem. This included facilitating informed choice, developing a more genuine nurse-patient partnership and configuring services around patients (**Piper, 2006**).

Teaching the patient is a major role of the nurse in restoring health, promoting health and preventing illness. The hospital nurse plays many roles as one of the health care team. When a person is ill, the nurse demonstrates things the patient can do to help with recovery. Whenever the nurse works with a patient, the nurse uses the opportunity to teach that person about

self-care. Nurses teach both patients and their families about proper diet and nutrition, cleanliness and hygiene, exercise, sleep and rest, signs and symptoms to be aware of, health habits, how to continue caring for themselves at their home and all the other aspects of a healthy life. Before the patient leaves the hospital, the nurse teaches the patient and family about care at home. The nurse tries to protect the patient against anything that might be harmful in the environment. Nurse teaches people how to minimize the effect of disability so that they will have the best quality of life (**Straus et al., 2006**).

The teaching can occur as spontaneous answers to questions from patients or more formal educating including a plan and resource materials. Patients are held in-house for increasingly shorter stays and are going home sicker, precipitating a greater need for instruction and information than ever before. The information the nurse provides them during their hospital stay will hopefully help them gain a full recovery and decrease the risk of readmission. So the health team should be educate patients effectively by provide oral and written instructions for the patient/Caregiver discharge, which should include: What to expect in terms of side effects, when and how to remove dressings, Signs or symptoms that should prompt a phone call to physician, such as: Severe headache, Nausea and Vomiting, Swelling, redness, continuous bleeding or other drainage. Also, Any restrictions in activity, showering, food, fluids, etc. and Instructions for medication use for discomfort (**Warner et al., 2006**).

#### **Significance of the study:**

The patients are at risk for developing a headache after they undergo a lumbar puncture for diagnostic or therapeutic purposes. These headaches are likely due to leakage of cerebrospinal fluid at the puncture site. While usually mild and self-limited, some headaches may be persistent and severe, adding to the distress of these patients. In the past 10 years, refinements in lumbar needle size and shape as well as procedural techniques reduced the tissue trauma that predisposes patients to headache. A number of interventions, such as bed rest, hydration, caffeine administration, and epidural blood patching, have been suggested to prevent and relieve the headaches that follow lumbar punctures (**Hammond et al., 2011**).

So that, there is a great interest to conduct such type of research, which might assist such patients to safely and effectively cope with the remarkable physical and psychological changes related to post lumbar puncture headache and its associated symptoms. In addition, patients complain from severe

or moderate headache post lumbar puncture, which hinder their ability of early mobilization, eating, and self-caring.

#### **Aim of the study**

The aim of this study was to examine the effect of pre-discharge instructions on prevention of headache and its associated symptoms among patients undergoing diagnostic lumbar puncture. This aim was achieved through the following:

1. Assess patients' knowledge regarding to lumbar puncture procedure and its complications and how to overcome these complications.
2. Identify the different risk factors among the patients that leading to post lumbar puncture headache and associated symptoms
3. Design, implement and disseminate the lumbar puncture instructions based on patients' actual needs assessment.
4. Evaluate its effect on the prevention of post lumbar puncture headache and associated symptoms among the patients undergoing diagnostic lumbar puncture.
5. Evaluate the effect of pre discharge lumbar puncture instructions on patients' knowledge and perception.

#### **Hypothesis of the study**

1. It was hypothesized that the patients undergoing lumbar puncture who will be exposed to pre discharge instructions regarding the lumbar puncture procedure (study group) will have a lower intensity of post lumbar headache compared to the control group.
2. Patients undergoing the lumbar puncture who will be exposed to educational nursing instructions regarding the lumbar puncture procedure (study group) will have a lower incidence of associated symptoms compared to the control group.

## **2. Subjects and Methods:**

#### **Research design**

A quasi experimental research design was utilized in the study.

#### **Setting**

The study was conducted at lumbar puncture unit at hematology and hereditary department (medicine 12) affiliated to Ain Shams University Hospital.

#### **Subjects:**

Purposive sample of patients admitted to the previous mentioned setting from January 2011 to November 2011 were selected. The patients had indication for diagnostic lumbar puncture. Patients were excluded if their ages were less than 18 years, a previous LP performed during the preceding week and had a chronic headache. In addition, any absolute contraindications for LP such as platelets count  $< 80 \times 10^9/L$ , presence of infected skin over the needle entry site and relative contraindications include increased

intracranial pressure (ICP), coagulopathy and brain abscess (**Cooper, 2011**). Consecutive recruitment of the patients was done after application of the inclusion and exclusion criteria. Then, patients were alternatively assigned to either the study or control groups, ending with **30** patients in each group. The study group patients received pre lumbar puncture instructions, while the control group patients were subjected to routine hospital care. There were no statistically significant differences between the control and study groups regarding to demographic characteristics. This was important to ensure comparability of the two groups, and indicate the successful randomization.

The total number of cases undergoing diagnostic LP at 2010 was 1460. The sample of the patients from lumbar puncture unit was chosen randomly according to the previous certain criteria. The sample size was estimated with STATA 10 program. The estimated required sample size were 60 patients (30 patients for each group) to achieve power of study  $= 1 - \beta = 0.95$  and Alpha  $\alpha = 0.01$  (sig. 99%).

#### **Tools of data collection**

The following tools were utilized to collect data related to this study:

- 1- **The patient Lumbar puncture interview questionnaire**, (Pre and Post Lumbar puncture procedure) it was adapted from **Blennow and the Alzheimer's Association (2010)** and validity and reliability were ascertained statistically.. It was included two parts: **first part**: it was used to assess patient's demographic data such as age, gender, body weight, level of education and patient's medical history of headache and patient's clinical diagnosis reason for performing LP, patient's history of chronic pain disorders and assessment of vital signs. **Second part**: It was used to assess patients' information toward lumbar puncture and its related complications as headache and its associated symptoms. The total score of knowledge was 30 degree. The Score one was given for each correct answer and zero for incorrect answer. For each area of knowledge, the scores of the items were summed-up and the total score divided by the number of the items. These scores were converted into a percent score. The total patients' knowledge was considered satisfactory if the percent score was 60% or more, and unsatisfactory if less than 60%.
- 2- **Headache Diary (Post Lumbar puncture procedure throughout seven days)**: recorded daily by the patients in the control and study groups from the first day of lumbar puncture to seven days later. It was adapted from **Rothrock (2006)** and validity and reliability were ascertained statistically. It was used to assess the following

items: date, time of headache began, time headache ended, warning signs (aura), location of pain, type of pain, intensity of pain and other associated symptoms such as **general symptoms** as nausea or vomiting, neck stiffness and paresthesia. **Ear symptoms as:** muffling of noise and tinnitus. **Eye symptoms as:** double vision and photophobia. Also, it was used to assess the medication taken, hours of sleep the night before the headache and position assumed after LP procedure.

### 3- Headache Impact Test™ questionnaire (HIT-6TM) (Version 1.1) Post lumbar puncture procedure:

It was used to measure the severity of headache and helps patients to communicate the severity of their headache pain to their healthcare provider. It helps to determine the headache impact on the patient's daily living activities. HIT was adopted from **Yang et al. (2011)**. It is a six 5-point patient self-report. The patient had to record the grade of headache as follows: 0= **Never**, 1= **Rarely**, 2= **Sometimes**, 3= **Very Often** and 4= **Always**. Higher scores indicate greater impact on patients' life. The Score range is 36-78. If the Score was 60 or more, the headache is having a very severe impact on patient's life. If the Score 56 – 59, the headache is having a substantial impact on patient's life. If the Score 50 – 55, the headache is having some impact on patient's life. If the Score 49 or less, the headache is having little to no impact on patient's life at this time.

4- **LP Patient' s perception sheet:** It was adopted from (**Carrage, 1997**). It was used to assess the patient' s perception toward lumbar puncture procedure instructions. It was based on the seven quantitative ratings of the patient' s perception categories namely: prior planning information, Instructions regarding LP positions during procedure, instruction given (rationales explained), opportunity to ask questions, written information provided, Availability of information sources (doctors or nurses) and time available for instructions. The scoring system for the rating scale as following: 1 = unsatisfactory so poor that it had a negative effect, 2 = poor below what consider acceptable, 3 = satisfactory generally acceptable, 4 = good very positive / helpful, and 5 = exceptional highly stimulating.

### Content and Face validity:

It was ascertained by a group of 7 experts including Medical-Surgical Nursing, Lumbar puncture and neurology experts. Their opinions were elicited regarding to the tool format layout, consistency, and scoring system. The content validity of the tools was tested regarding to the knowledge accuracy, relevance and comprehensiveness.

### Ethical considerations and human rights:

In the planning stage, approval was obtained from the Ain Shams University Hospital authorities, and verbal consent was then obtained from the director of hospital and head nurse. All patients were informed about each procedure and their rights, according to medical research ethics, that they were free to decide whether or not they would participate in the study without any effect on their care. Then, informed consent was obtained from patients who agreed to participate. Methods and objectives of the study were clearly described for each patient.

### Pilot study:

A pilot study was carried out on 10 % of patients to test the clarity and practicability of the tools. Pilot Subjects included in the pilot study were adding to the study, as there was no radical modification was done.

### Conceptual framework

A number of administration variables have been found to influence post lumbar puncture headache. These include patient's position, needle size, needle design and direction of bevel. In the current research, the administration variable of Lumbar puncture position was fixed; it was the lateral position for all the patients. It is common to use the lateral position for lumbar puncture. This position flexes the back and widens the space between the vertebrae (backbones), and therefore improves access for inserting the needle (**Majd, et al., 2011 & Beigh et al., 2011**). **The second variable** was the needle size. The needle size used in the present study was 21-gauge needles for all patients. The smaller the needle diameter, the less the risk of post-lumbar puncture headache. Smaller needles create a proportionally smaller tear in the dura, thus lessening the potential for leakage (**Lavi et al., 2006**). The third administration variable was needle design. The **Trephine Needle** was used for all patients in the LP unit. **The fourth administration variable** was the direction of bevel. The incidence of post lumbar puncture headache can be reduced by ensuring that the bevel of the needle is inserted parallel, not perpendicular, to the dural fibers. The dural fibers run parallel to the long axis of the spine; insertion of the bevel at this angle severs fewer fibers in the dura than does perpendicular insertion.

All tests were done by the same needle in L3-L4 intervertebral space on the line between two iliac crests by only one experienced neurologist.

### Operational Phase:

#### Lumbar puncture pre discharge instructions design:

The instructions was especially designed and used in the study. It was designed in Arabic language, and content was built on review of related literature (**Evans, et al., 2006, Halker et al., 2007 and Smith and Hirsch, 2009**), as well as on patients' needs during the

initial pre-test. Each part of the instructions was pertaining to a different aspect of the lumbar puncture procedure and how to manage their complications. It included; Definition of lumbar puncture (LP), indication of this procedure, preparation for the procedure, what will happen during the procedure, the pain experienced during the procedure, how long does the procedure take? What will happen after the needle is removed? what the patient can do the day after the procedure? What are the risks? and other home care instructions regarding to proper hydration, bed rest and proper nutrition, how to manage back pain resulting from puncture needle and other instructions regarding to bathing and activities of daily living.

**Content of the pre discharge LP instructions** were tested through 7 experts' opinions. The instructions was revised by a group of four experts in Medical Surgical Nursing at faculty of Nursing and three medical neurosurgery experts at faculty of medicine at Ain Shams University for the content validity. Based on the opinion of a panel of expertise some modifications were done, and then the final forms were developed.

#### **Procedures:**

This study was conducted through four consecutive phases: assessment, planning, implementation and evaluation.

- **Assessment phase:** This phase aimed to identify the studied patients' characteristics and to assess patients' knowledge regarding post lumbar puncture headache and associated symptoms.
- **Planning and preparatory phase:** based on the assessment phase, the instructions' contents and media (in the form of the instructions brochure and visual materials) were prepared by the researchers and the pilot study was done.

**Implementation phase:** The patient's Lumbar puncture interview questionnaire was filled in the clinical area by the researchers who were available according the procedure schedule of patients' name in the LP unit. Afterwards, Headache Impact Test™ questionnaire (HIT-6TM) (Version 1.1) and Headache diary sheet were distributed to the patients, and they were informed on how to evaluate the headache from the first day after lumbar puncture for 7 days. The researchers trained the patients before the study on using the previous tools, and applied it on 60 patients of study and control groups undergoing lumbar puncture. The instructions were designed based on analysis of the collected data and implemented by using the pre-constructed tools. The objective of the instructions were established and guided by the previously determined educational needs, in order to improve patients' knowledge regarding to lumbar puncture procedure and the headache and associated

symptoms as common complications of it. Then implementation of the instructions was carried out at the previously mentioned study settings for each patient in the study group separately for one successive session pre lumbar puncture procedure. The researchers also repeated the instructions to assert that all patients are acquainted the instructions contents. The session took approximately 1.5 to 2 hours. Arabic language was used to suit the patients' level of understanding. Methods of teaching used were real situations, modified lectures, group discussion and demonstration. An instructional media was used; it included instruction brochure and audiovisual materials. Most of the studied patients in all study settings were cooperative with the researchers.

- **Evaluation phase:** the evaluation phase was emphasized on estimating the effect of the pre discharge LP instructions on patients' knowledge and perception\_post intervention after four weeks from instructions implementation. Also, the evaluation phase was emphasized on estimating the effect of the instructions on incidence and severity of post lumbar puncture headache and associated symptoms for patients in order to compare between the results pre, and post instructions intervention. Evaluation of the instructions' outcomes was completed using the previous tools for four weeks after instructions implementation (pre, and post). The majorities of the patients were punctual because the importance of the topics, hence, most of the teaching sessions were done for one or small groups, which consumed much time and efforts from the researchers to cover the whole sample. Yet the patients found that they were very interested by implementation of the instructions. Comparison between the data before and after the instructions' intervention was done to determine the effectiveness of these instructions.

#### **Statistical analysis**

Data entry and statistical analysis were done using SPSS 16.0 software package. Quantitative continues data compared using the non-parametric Mann-Whitney test. t test was used to compare means .qualitative categorical variables were compared using chi-square test .Statistical significance was considered at p-value <0.05.

#### **3. Results**

**Table 1** describes the patients' characteristics of the study and control groups. It shows that the two groups were identical as regards the most important characteristics that might affect the occurrence of post lumbar puncture headache and associated symptoms. Thus, it shows no statistically significant differences in their age, gender, body weight, level of education as

well as the history of headache, previous LP and diagnosis. In both groups, the range of patients' age were between 20 - 50 years old, with mean age  $36.7 \pm 11.5$  and  $36.9 \pm 10.7$  for control and study group respectively. With more females than males in both groups. 56.7% of the control group and 70% of the study group had a history of headache. More than half of them can read and write. Less than half of the two groups were performed previous LP. The most common diagnosis among study and control groups was leukemia, aplasia and lymphoma.

Table (2) illustrates the differences between sleeping hours, common position assumed by the patients during sleep and analgesic intake among the study and control groups after LP procedure as stated by the patients. The mean of sleeping hours among the control group was  $10.4 \pm 1.5$  and in the study group was  $15.2 \pm 3.2$  with highly significant difference between them ( $X^2 31.7$  at  $P < 0.01$ ). As regard to the analgesic intake as stated by the patients more than half (63.7 %) of the study group and 56.7 % of the control group had not take analgesic with no statistically significant different between the two groups ( $X^2 0.3$  at  $P > 0.05$ ). While, the most common position assumed by the patients after LP were lateral position among the control and study patients (33.3% and 56.7% respectively) with highly statistical significant differences between two groups ( $X^2 13.5$  at  $P < 0.01$ ).

Table 3 displays the various measurements done and clinical symptoms assessed among patients before and after the LP procedure. It is evident that the two groups, study and control, were similar in all measurements and assessments before the procedure. Thus, no statistically significant differences were detected in their baseline blood pressure, heart rate, or in the severity of palpitation. Systolic and diastolic blood pressure in both groups slightly decreased after the procedure, with no statistically significantly differences between the two groups. As for the heart rate and the severity of palpitations the means were statistically significantly lower in the study group, compared to the control group,  $p < 0.001$

Figure 1 shows patients' knowledge pre/post LP instructions. The patient's knowledge mean score was  $29.3 \pm 17.6$  pre and  $48.3 \pm 15.4$  post intervention in the control group. While, the patient's knowledge in the study group showed that the mean score increased from  $29.7 \pm 15.4$  to  $85.3 \pm 13.6$  post intervention. There was no statistically significant difference between control and study group pre intervention ( $T 0.07$  at  $P > 0.05$ ). While there was a highly statistically significance difference between the control and the study group post intervention ( $T 10.5$  at  $P < 0.01$ ).

Table 4 reveals the difference between post lumbar puncture headache intensity in both groups through the seven days post lumbar puncture. Higher rate was among the control group compared to the study group with highly statistical significant difference from day two to seven day at  $P < 0.01$ .

Figure 2: illustrated the PLPH location among the control and study group post instructions implementation. It was showed that, half (50%) of the control group and less than half (43 %) of the study group mentioned that they had a postural headache, while 26.67 % of the control group and 20.33% of the study group had occipital headache with no statistically significant differences at  $P > 0.05$ . Also, It was found that 3.33% of the control group and 16.67% of the study group had frontal headache with statistically significant difference between two groups at  $P < 0.05$ . Also, it was found that 20% for both groups were complain from fronto occipital headache with no statistically significant differences at  $P > 0.05$ .

Table (5) Illustrated the impact of the headache on the patient's daily activities among the study and control groups. It was revealed that the headache impact test results among the control group is higher than the study group with a highly statistically significance difference between control group and the study group ( $X^2 12.3$  at  $P < 0.01$ ).

Table (6) showed the incidence of associated post Lumbar puncture symptoms. There was a statistically significance difference in occurrence of all symptoms with higher rate among control group compared to the study group except in vomiting, tinnitus, muffling of noise, diplopia and photophobia there were insignificant differences between the two groups at  $P > 0.05$ .

Table (7) showed the correlation between the intensity of post lumbar puncture headache and patients characteristics of the control and the study groups. There was a highly statistically significant difference between the intensity of headache and the female patients, body weight from 45 to 55 kg and the patients with previous LP (at  $P < 0.01$ ). While, there was a statistically significant difference between the intensity of headache and the age from 20 to 40 years, analgesic intake, patients with leukaemia, analgesic intake, history of headache and lateral position during sleep after LP (at  $P < 0.05$ ). Meanwhile, there was no significant difference between the intensity of the headache and level of education and sleeping hours post LP procedure (at  $P > 0.05$ ).

Table (8) reveals patients' perception in the study and control groups regarding the given instructions post LP procedure. It was observed that there were positive perception regarding prior preparation and planning for LP. While, there was a positive perception in the study group and negative perception

in the control group regarding instructions about LP positions during procedure, instruction given (rationales explained), opportunity to ask questions instruction, written information provided, discharge

and home care written instructions, availability of information sources (Doctors or nurses) and time available for instructions with highly statistically significant difference at ( $P < 0.01$ ).

**Table (1):** Difference between the patients' characteristics in the study and control groups

Characteristic	Groups				X <sup>2</sup> test		
	Control group (N = 30)		Study group (N = 30)		X <sup>2</sup>	P	Sig
	No	%	No	%			
<b>Age</b>							
20 – 40	18	60.0%	17	56.7%	0.07	> 0.05	NS
40 +	12	40.0%	13	43.3%			
Range	20 - 50		20 - 50				
Mean ± SD	36.7 ± 11.5		36.9 ± 10.7				
<b>Gender</b>							
Male	12	40.0%	14	46.7%	0.3	> 0.05	NS
Female	18	60.0%	16	53.3%			
<b>Body Weight</b>							
45 – 55	9	30.0%	9	30.0%	0.1	> 0.05	NS
55 – 65	13	43.3%	14	46.7%			
65 +	8	26.7%	7	23.3%			
Range	48 - 76		46 - 74				
Mean ± SD	59.4 ± 7.7		59.6 ± 8.3				
<b>level of education</b>							
University degree	6	20.0%	7	23.3%	0.3	> 0.05	NS
Secondary degree	4	13.4%	5	16.7%			
Read and write	20	66.6%	18	60.0%			
<b>History of Headache</b>							
Yes	17	56.7%	21	70.0%	1.1	> 0.05	NS
No	13	43.3%	9	30.0%			
<b>Previous LP.</b>							
Yes	9	30.0%	9	30.0%	0.1	> 0.05	NS
No	21	70.0%	21	70.0%			
<b>Diagnosis</b>							
Leukemia	10	33.3%	12	40.0%	0.3	> 0.05	NS
Aplasia	9	30.0%	8	26.7%			
Lymphoma	11	36.7%	10	33.3%			

(NS) Not statistically significant at  $p < 0.01$

**Table (2):** The difference between sleeping hours, common positions assumed by the patients during sleep and analgesic intake among the study and control groups post LP procedure.

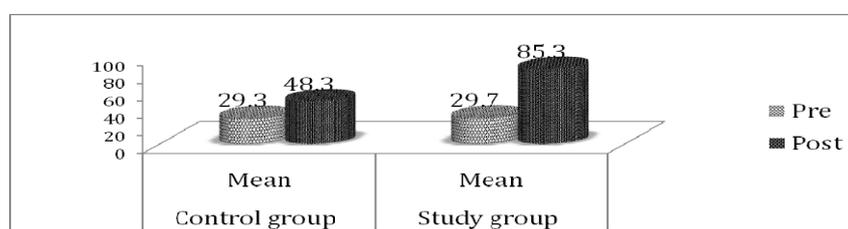
Characteristic	Groups				X <sup>2</sup> test		
	Control group (N = 30)		Study group (N = 30)		X <sup>2</sup>	P	Sig
	No	%	No	%			
<b>Sleep Hours</b>							
8 – 12	20	66.7%	4	13.3%	31.7	< 0.01	HS
12 – 14	10	33.3%	6	20.0%			
14 +	0	0.0%	20	66.7%			
Range	8 - 13		10 - 20				
Mean ± SD	10.4 ± 1.5		15.2 ± 3.2				
<b>Analgesic intake</b>							
Yes	13	43.3%	11	36.7%	0.3	> 0.05	NS
No	17	56.7%	19	63.3%			
<b>Position during sleep after procedure</b>							
Lateral	10	33.3%	17	56.7%	13.5	< 0.01	HS
Supine	9	30.0%	13	43.3%			
Prone	6	20.0%	0	0.0%			
Head down position	5	16.7%	0	0.0%			

(HS) Highly statistically significant at  $p < 0.01$  (S) Statistically significant at  $p < 0.05$

**Table 3.** Difference between mean score of hemodynamic signs and symptoms among patients in the study and control groups before and after lumbar puncture procedure

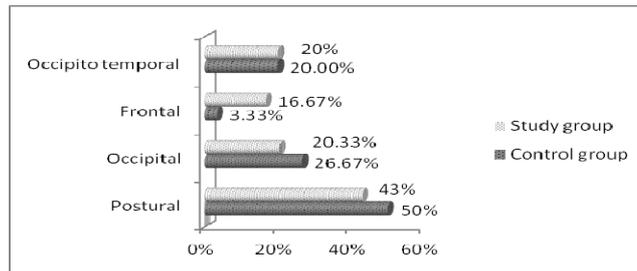
Hemodynamic signs and symptoms	Mean±SD		Mann-Whitney	p-value
	Control (n=30)	Study (n=30)		
<b>Systolic BP (mm Hg)</b>				
Before the LP procedure	115.0±13.1	120.33±13.5	2.31	0.13
After LP procedure	99.0±12.8	104.5±14.8	2.03	0.15
<b>Diastolic BP (mm Hg)</b>				
Before the LP procedure	80.8±6.2	81.2±7.4	0.05	0.83
After LP procedure	66.7±6.5	67.2±7.5	0.03	0.87
<b>Heart rate (bpm)</b>				
Before the LP procedure	82.5±1.3	80.6±3.9	2.00	0.16
After LP procedure	88.6±5.5	83.7±4.4	12.29	<0.001*
<b>Palpitation (score: 1-3)</b>				
Before the LP procedure	0.3±0.5	0.2±0.4	0.79	0.38
After LP procedure	2.4±0.7	1.5±1.0	13.80	<0.001*

(\*) Statistically significant at p&lt;0.05

**Fig.1.** Mean score of patients' knowledge among the study and control group pre/post lumbar puncture guidelines intervention.**Table (4):** The difference between post lumbar puncture headache intensity among the study and control groups.

Headache intensity characteristic	Groups				X <sup>2</sup> test		
	Control group (N = 30)		Study group (N = 30)		X <sup>2</sup>	P	Sig
	No	%	No	%			
<b>Day 1</b>							
Mild	3	10.0%	10	33.3%	7.8	< 0.05	S
Moderate	12	40.0%	14	46.7%			
Sever	15	50.0%	6	20.0%			
<b>Day 2</b>							
Mild	5	16.7%	17	56.7%	14.5	< 0.01	HS
Moderate	20	66.6%	13	43.3%			
Sever	5	16.7%	0	0.0%			
<b>Day 3</b>							
Non	0	0.0%	1	3.3%	16.9	< 0.01	HS
Mild	12	40.0%	26	86.7%			
Moderate	17	56.7%	3	10.0%			
Sever	1	3.3%	0	0.0%			
<b>Day 4</b>							
Non	0	0.0%	11	36.7%	16.8	< 0.01	HS
Mild	25	83.3%	19	63.3%			
Moderate	5	16.7%	0	0.0%			
<b>Day 5</b>							
Non	7	23.3%	22	73.3%	15.3	< 0.01	HS
Mild	22	73.4%	8	26.7%			
Moderate	1	3.3%	0	0.0%			
<b>Day 6</b>							
Non	13	43.3%	27	90.0%	14.7	< 0.01	HS
Mild	17	56.7%	3	10.0%			
<b>Day 7</b>							
Non	19	63.3%	29	96.7%	10.4	< 0.01	HS
Mild	11	36.7%	1	3.3%			

(HS) Highly statistically significant at p&lt;0.01 (S) Statistically significant at p&lt;0.05



**Fig. 2.** The PLPH location among the control and study group post instructions implementation

**Table (5):** The impact of the headache on the patients' daily activities among the study and control groups

Impact of headache on patient daily activities	Groups				X <sup>2</sup> test		
	Control group (N = 30)		Study group (N = 30)		X <sup>2</sup>	P	Sig
	No	%	No	%			
Sever	8	26.7%	3	10.0%	12.3	< 0.01	HS
Substantial	5	16.7%	3	10.0%			
Some	11	36.6%	6	20.0%			
Little or No	6	20.0%	18	60.0%			

(HS) Highly statistically significant at p<0.01

**Table (6):** The incidence of associated post Lumber puncture symptoms among the study and control group

Associated post Lumber puncture symptoms	Groups				X <sup>2</sup> test		
	Control group (N = 30)		Study group (N = 30)		X <sup>2</sup>	P	Sig
	No	%	No	%			
<b>I- General Symptoms:</b>							
1-Nausea							
Yes	24	80.0%	12	40.0%	10	< 0.01	HS
No	6	20.0%	18	60.0%			
2-Vomiting							
Yes	12	40.0%	6	20.0%	2.9	> 0.05	NS
No	18	60.0%	24	80.0%			
3- dizziness							
Yes	24	80.0%	12	40.0%	10	< 0.01	HS
No	6	20.0%	18	60.0%			
4- Neck stiffness							
Yes	13	43.3%	4	13.3%	6.6	< 0.01	HS
No	17	56.7%	26	86.7%			
<b>II- Ear symptoms:</b>							
1- Muffling of noise							
Yes	3	10.0%	2	6.7%	0.2	> 0.05	NS
No	27	90.0%	28	93.3%			
2- Tinnitus							
Yes	10	33.3%	4	13.3%	3.7	> 0.05	NS
No	20	66.7%	26	86.7%			
<b>III- Eye symptoms:</b>							
1- Photophobia							
Yes	4	13.3%	1	3.3%	1.9	> 0.05	NS
No	26	86.7%	29	96.7%			
2- diplopia							
Yes	2	6.7%	0	0.0%	2.1	> 0.05	NS
No	28	93.3%	30	100.0%			

(HS) Highly statistically significant at p<0.01 (S) Statistically significant at p<0.05

(NS) Not statistically significant at p > 0.05

**Table (7):** Correlation between intensity of post lumbar puncture headache and patients characteristics of the study and control groups.

Characteristics	Groups								X <sup>2</sup> test		
	Control group (N = 30)				Study group (N = 30)				X <sup>2</sup>	P	Sig
	Mild		Moderate		Mild		Moderate				
	NO	%	NO	%	NO	%	NO	%			
<b>Age</b>											
20 – 40	14	46.7%	4	13.3%	17	56.7%	0	0.0%	4.2	< 0.05	S
40 +	9	30.0%	3	10.0%	12	40.0%	1	3.3%	1.4	> 0.05	NS
<b>Gender</b>											
Male	12	40.0%	0	0.0%	13	43.3%	1	3.3%	0.8	> 0.05	NS
Female	11	36.7%	7	23.3%	16	53.3%	0	0.0%	7.8	< 0.01	HS
<b>Weight</b>											
45 – 55	3	10.0%	6	20.0%	9	30.0%	0	0.0%	9	< 0.01	HS
55 – 65	13	43.3%	0	0.0%	13	43.3%	1	3.3%	0.9	> 0.05	NS
65 +	7	23.4%	1	3.3%	7	23.4%	0	0.0%	0.9	> 0.05	NS
<b>Level of education</b>											
University degree	5	16.7%	1	3.3%	7	23.3%	0	0.0%	1.3	> 0.05	NS
Secondary degree	15	50.0%	5	16.7%	17	56.7%	1	3.3%	2.6	> 0.05	NS
Read and write	3	10.0%	1	3.33%	5	16.7%	0	0.0%	1.4	> 0.05	NS
<b>Sleep Hour</b>											
8 – 12	13	43.4%	7	23.3%	3	10.0%	1	3.3%	0.15	> 0.05	NS
12 – 14	10	33.3%	0	0.0%	6	20.0%	0	0.0%	NA	NA	NA
14 +	0	0.0%	0	0.0%	20	66.7%	0	0.0%	NA	NA	NA
<b>Previous LP.</b>											
Yes	3	10.0%	6	20.0%	9	30.0%	0	0.0%	9	< 0.01	HS
No	20	66.7%	1	3.33%	21	70%	0	0.0%	0.9	> 0.05	NS
<b>Diagnosis</b>											
Leukemia	7	23.3%	4	13.4%	10	33.4%	0	0.0%	4.5	< 0.05	S
Aplasia	7	23.3%	2	6.7%	7	23.3%	1	3.3%	0.3	> 0.05	NS
Lymphoma	9	30.0%	1	3.3%	12	40.0%	0	0.0%	1.3	> 0.05	NS
<b>Analgesic intake</b>											
Yes	7	23.3%	6	20.0%	10	33.4%	1	3.3%	3.9	< 0.05	S
No	16	53.4%	1	3.3%	19	63.3%	0	0.0%	1.1	> 0.05	NS
<b>History of Headache</b>											
Yes	11	36.7%	6	20.0%	20	66.7%	1	3.3%	5.8	< 0.05	S
No	12	40.0%	1	3.3%	9	30.0%	0	0.0%	0.7	> 0.05	NS
<b>Position during sleep after LP</b>											
Lateral	7	23.3%	3	10.0%	15	50.0%	0	0.0%	5.1	< 0.05	S
Supine	8	26.7%	1	3.3%	12	40.0%	1	3.3%	0.07	> 0.05	NS
Prone	4	13.3%	2	6.7%	1	3.3%	0	0.0%	0.5	> 0.05	NS
Head down position	4	13.3%	1	3.3%	1	3.3%	0	0.0%	0.2	> 0.05	NS

**Table (8). The difference between patients' perception in the study and control groups regarding the given instructions post LP procedure.**

Patients' perception	Control group (N = 30)				Study group (N = 30)				X <sup>2</sup> test		
	Negative		Positive		Negative		Positive		X <sup>2</sup>	P	Sig
Prior planning information	0	0.0%	30	100.0%	0	0.0%	30	100.0%	No change		
Instructions regarding LP positions during procedure	18	60.0%	12	40.0%	0	0.0%	30	100.0%	25.7	< 0.01	HS
Instruction given (rationales explained)	28	93.3%	2	6.7%	0	0.0%	30	100.0%	52.2	< 0.01	HS
Opportunity to ask questions	20	66.7%	10	33.3%	0	0.0%	30	100.0%	30	< 0.01	HS
Written information provided	22	73.3%	8	26.7%	0	0.0%	30	100.0%	34.7	< 0.01	HS
Discharge and home care written instructions	27	90.0%	3	10.0%	1	3.3%	29	96.7%	45.3	< 0.01	HS
Availability of information sources	22	73.3%	8	26.7%	1	3.3%	29	96.7%	31.1	< 0.01	HS
Time available for instructions	30	100.0%	0	0.0%	0	0.0%	30	100.0%	60	< 0.01	HS

(HS) highly statistically significant at p&lt;0.01

#### 4. Discussion:

Lumbar puncture is a very common diagnostic procedure. Post lumbar puncture headache is very common to occur after the procedures. So, the aim of the present study was to examine the effect of pre-

discharge LP instructions on the occurrence of post lumbar headache and its associated symptoms.

Comparison of the patients' characteristics in the study and control groups, revealed no statistically significant differences between them. This was important to ensure comparability of the two groups

and indicate successful randomization of the two groups. As regarding patients' age, more than half of the studied and control subjects were from twenty to forty years old, female and they also read and write. As regard to the body weight, it was showed that, near of the half was from fifty five to sixty five kilograms. Also, as regard to the history of the headache and diagnosis, it was showed that, more than half of the study and control groups were complained from previous headache and less than half of them had leukemia. These results may be the reason for that all the patients in the control and study group were complained from headache with different intensity.

These previous mentioned results were supported by **Bezov et al. (2010)** who stated that, the headache after lumbar puncture is relatively common and is a significant cause of morbidity, especially those who are in a high risk category, such as young women with a low body mass index, and during pregnancy. **Lavi et al. (2010)** found that, the incidence is relatively low in children and inversely proportional to age in adults, with the highest incidence in the age group 20- 40. Post-dural puncture headache seldom occurs in persons aged over 60. Women are twice as much at risk as men. Also, **Nor Legeforen (2012)** stated that Persons with migraine or other chronic headache, and those who have previously had post-dural puncture headache, have about three times as high a risk of developing the condition. Meanwhile, **Gribben (2008)** who illustrated that, the headaches and other neurologic symptoms such as seizures, dizziness, visual changes and nausea and vomiting may occur when leukemia cells invade the fluid surrounding the brain and spinal cord or cerebrospinal fluid (CSF).

Concerning with The differences between sleeping hours and common position assumed by the patients during sleep post LP procedure, the results of the current study showed that highly statistically significant differences between the two groups, while there was insignificant differences between two groups regarding analgesic intake.

It showed that more than half of the study group were sleeping fourteen hours and more and assumed the lateral position during the sleep after LP procedure and less than half of them were taking the analgesics. This result might be due to their compliance with the pre discharge instructions taken. These findings were supported by **Wellbery (2005)** who stated that, the lateral position produces less tension on the dural rent than supine, and results in less leakage of CSF. The patients undergoing diagnostic lumbar puncture were instructed to maintain bed rest for 24 hours after the puncture.

Meanwhile, **Amorim et al. (2012)**, the simple analgesics such as acetaminophen and nonsteroidal anti-inflammatory drugs may provide some benefits.

As regard the hemodynamic signs and symptoms among patients in the study and control groups before and after LP procedure, the results of the current study showed that, there were insignificant differences between the two groups regarding the baseline blood pressure. As for the heart rate, the severity of palpitations means, there were statistically significantly differences between the two groups. This might be due to that the patients after the instructions given follow the instructions toward bed rest, hydration, and proper position after LP procedure. This result was congruent with **Ahmed et al. (2006)** who illustrated that, the Throbbing and orthostatic nature of headache constitutes an important symptom of cerebral vasodilatation and intracranial congestion of blood and supports the hypothesis that the loss of CSF causes compensatory cerebral vasodilatation resulting in PDPH.

Concerning with patients' satisfactory level of knowledge related to lumbar puncture and its complications pre discharge instructions implementation, revealed that the majority of the patients at two groups (study & control) had unsatisfactory knowledge as indicated by the unsatisfactory scores. While there were highly statistical significant differences between the two groups at post instructions implementation. This result was congruent with (**Warner, et al. 2006 and Jernigan, 2009**) who stated that, Patients teaching are always an integral part in the duties of all health care team. Patient education is a very important aspect of treating the patients. Not educating a patient about their care and providing direction for understanding leaves the patient at risk of having complications. These complications can cause unnecessary admissions to the hospital, an increase in medication costs and financial burden to the patient, family and insurance company. Educating the patient is a simple and effective way to prevent these complications. Also, **Bastable, et al. (2011)** illustrated that, rapid discharge from acute care facilities is increasingly forcing patients to be more independent in managing their own health. Appropriate teaching and learning methods can increase patients' adherence with therapeutic rehabilitation.

In the present study, the majority of the control and the study group had post lumbar headache from the first day after lumbar puncture. It was evidenced that the higher incidence of occurrence of PLPH was prevailing with a statistically significant difference in

day one in both groups and highly significant different at day 2,3,4,5,6 &7. It was showed from the results that, the absence of headache was began at the third day in some cases in the study group meanwhile it was absent at the fifth day among some cases in the control group, which is supporting the hypothesis (1). This results is similar to **Straus et al. (2006)** and **Desai et al. (2010)** who reported rates of PDPH reaching as much as 70% and the occurrence of headache extent from the first day until the seventh day in both groups. This finding is similar to **Apfel et al. (2010)** who reported that 72% of post lumbar headaches lasted for seven days. Also, **Ahmed, et al. (2006)** who emphasized on, the headache after lumbar puncture is defined as “bilateral headaches that develop within 7 days after an lumbar puncture and disappears within 14 days. The headache worsens within 15 min of resuming the upright position, disappears or improves within 30 min of resuming the recumbent position”.

As regard to The PLPH location among the control and study group post intervention guidelines, it was showed that the majority of the patient in both study and control group were complained from postural, occipital and fronto-occipital headache with insignificant difference between them. This result was consistent with **Amorim et al. (2012)** who emphasized on, the patients with PLPHA characteristically present with frontal or occipital headache within 6 to 72 hours of the procedure that is exacerbated in an upright position and improved in the supine position.

As regard to the impact of PLPH headache on daily living activities between the two groups. It was showed that, the negative impact of the headache on the control group higher than the study group with a highly significant difference between them. This might be due to that the patients in the study group were following the pre discharge instructions regarding the bed rest, good hydration and proper position that will lead to improve quality of life. This result was congruent with **Forbes, (2012)** who mentioned that; the patient can resume normal activity once he feels comfortable to do so. Normal activity will not influence the risk of post-LP headache. And also, the operating heavy machinery or other tasks where might pose a risk for the patients or others should be delayed for about 24 hours to make sure that the patient are limited by a post-LP headache (which can be very painful and therefore very distracting). Driving is not normally recommended for about 24 hours after a lumbar puncture procedure, due to the risk of a sudden post-LP headache. Meanwhile, **Keneth et al. (2005)** stated that, Although PLPH is a self-limiting and nonfatal condition, its postural nature prevents the patient

from performing routine activity and many make them anxious and depressed. Therefore these patients require psychological support and a lot of reassurance in addition to therapeutic measures.

The present study reveled that there was a statistically significance differences between the control and study group regarding the occurrence of post lumbar puncture associated symptoms except in vomiting, tinnitus and photophobia, there were insignificant differences between the two groups. Nausea, and neck stiffness occurrence was less among the study group compared to control group .The same finding was found in the occurrence of eye symptoms and ear symptoms. This finding is support the hypothesis number (two) that means that there is an effect of using the pre discharge LP instructions for reduction of PLPH associated symptoms.

These results of the present study are in congruence with **Shah and Thomas (2007)** who highlighted that patient with PLPH may experience photophobia, nausea, vomiting, neck stiffness, tinnitus, diplopia, and dizziness. In a small percentage of patients, ocular and vestibular or cochlear symptoms may be seen. Meanwhile, **Amorim et al. (2012)** who stated that, the PLPH associated symptoms characteristically may include nausea, vomiting, dizziness, tinnitus, neck stiffness, and visual changes. Without treatment, the headache typically lasts 2 to 15 days.

The present study also, illustrated the correlation between intensity of post lumbar puncture headache and patients' characteristics among the control and study groups. It was showed that, the intensity of headache was increased among the young age, female patients, low body weight, patients not take any analgesic, patients had a leukaemia and previous LP, history of headache and lateral position during sleep after LP among the study and control group with a statistically significant difference. This result was in the same line with **Farley and McLafferty (2008)** who found that, Women are more likely to be affected than men when risk is adjusted for age. The women had twice the incidence (14%) of PDPH compared with men (7%). Also, PLPH in 20-40 years are most susceptible whereas the lowest incidence occurs after fifth decades. The lesser incidence of PDPH in elderly individual is due to decrease in the elasticity of cranial structures, which occurs in the normal aging elasticity of cranial structures, which occurs in the normal aging process, and reduction in overall pain sensitivity. As regard to the effect of analgesic intake post lumbar puncture, **Amorim et al. (2012)** stated that, simple analgesics such as acetaminophen and nonsteroidal anti-inflammatory drugs may provide some benefits to treat PDPH. Meanwhile, **Straus et al. (2006)** who

emphasized that the headache with nausea is the most common complication; it often responds to analgesics and infusion of fluids and can often be prevented by strict maintenance of a supine posture for two hours after the successful puncture. Also, **Ahmed et al. (2006)** mentioned that, as the number of dural punctures directly relates to the size of the dural damage, making fewer attempts at dural puncture could be associated with lesser incidence of headache after lumbar puncture. However, no studies have been conducted.

While there was no statistically relation between intensity of headache and the total sleeping hours post LP procedure and level of educations between study and control group. This result was congruent with **Wellbery (2005) who stated that**, the patients undergoing diagnostic lumbar puncture were instructed to maintain bed rest for 24 hours after the puncture. Meanwhile, **Teece (2002)** contradict this result, who stated that, we failed to demonstrate any difference in the incidence of PLPH between patients mobilized immediately after the procedure and those given 4 hours bed rest, so, this implies bed rest may be an unnecessary imposition on the patient.

Concerning patients' perception in the study and control groups regarding to LP pre discharge instructions. The results of the present study revealed that, The majority of patients among the study group were seen that the instructions was generally acceptable which means that the intervention was appreciated by the patient .The presence of headache among study group may be behind the rating. The present study also showed that the nursing instructions for patients in the study group might have a positive effect on reducing the occurrence of post lumbar symptoms and patients perception. This explanation was in line with the results of **Kenneth et al. (2005) and David (2007)**, who reported that, the benefits of patient education is improving patients' safety and adherence to interventions as well as patients' satisfaction.

In the same line (**Warner, et al., 2006**) mentioned that, the health team should be educate patients effectively by provide oral and written instructions for the patient/Caregiver discharge. Direct patient involvement in treatment decisions increases motivation, empowerment, adherence, and satisfaction. Also, **Bastable, et al. (2011)** who stated that, effective educational materials can help patients understand medical complexities while reducing anxiety and increasing compliance with instructions. Patient educational resources have the ability to change communication into actions and improve health. Furthermore, in modern health care, patient education is supported because it adds value to the management of various diseases and disorders.

Specific interventions aimed at increasing the patient's knowledge can improve the treatment outcomes of many acute and chronic illnesses.

### Conclusion

All of the studied patients (control and study) had PLPH, it was began to disappear at the third day in some cases in the study group while in the control group the headache was began to disappear at the fifth day with highly significant difference between two groups. Also, there was no statistically significant difference regarding total knowledge regarding PLPH and associated symptoms pre-instructions implementation, While there was a highly statistically significant difference post instructions implementation.. The intensity of the headache among the control group was higher compared to the study group with highly statistical significant difference from day two to seven day. The implementation of pre discharge LP instructions was effective in reducing the intensity of the PLPH and occurrence of associated symptoms. The impact of the headache on the control group higher than the study group with a highly significant difference between them regarding daily living activities. There was a significant difference between the personal characteristics and intensity of the headache. The intensity of headache was increased among the young age, female patients, low body weight, patients not take any analgesic after the procedure and patients with previous LP. The pre discharge instructions had a positive effect in increasing the level of perceptions in the study group patients.

### Recommendations

It was recommended to use the Arabic Instructions in outpatients for patients undergoing lumbar puncture and further studies should be carried out on a large number of subjects for evidence of results and generalization. Also, further study is recommended to evaluate the association between post lumbar puncture headache and its associated factors.

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