

# Etiologies of Lumbar Puncture Refusal in Pediatric Patients in Children's Hospital, Taif City, Saudi Arabia. A Cross-Sectional Study

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## Abstract

**Background:** Lumbar Puncture (LP) is a medical emergency operation in which a needle is inserted into the lower back's spinal canal for diagnostic and therapeutic purposes. Even though LP has a high diagnostic and therapeutic value, many parents refuse to have their children tested.

**Objectives:** to assess the misunderstanding regarding LP among parents in Taif city.

**Methods:** A cross sectional study was done on 687 parents of children who required LP procedure from birth till the age of 18 in Taif Children Hospital from January 2020 to May 2020. Data about participants demographics, ever been asked to take a sample of the cerebrospinal fluid (LP) of the child, circumstances related to this event were collected. For those who were not asked a question of "if it was needed to take a sample of the cerebrospinal fluid of one of your children, will you agree?" was added.

**Results:** 15.7% of parents were asked to take a sample of the cerebrospinal fluid of one of their children, of whom, 61.2% agreed, with the average age of the child at the LP being  $2.24 \pm 3.28$  years. A consultant discussed the LP technique to 37.8% of them, and 86.5% and 56.2% said the doctor clarified the nature and complications of the treatment to them. For parents not asked for LP before, 41.4% will not agree to it in the future. For parents who refused LP when indicated and those refusing it in the future, the most common causes were the side effects such as paralysis (60.6%), pain (11.3%) and no trust in HCWs and fear of medical errors (10.9%). For them, the most common sources of refusal were information from friends and relatives (41.2%).

**Conclusion:** There is a need for health education of parents about the importance and nature of LP to overcome barriers that lead to LP refusal.

**Key words:** etiologies, LP, refusal, pediatric, Taif, Saudi.

## Introduction

Lumbar Puncture (LP) is a medical emergency procedure that involves inserting a needle into the spinal canal in the lower back for diagnostic and therapeutic purposes [1]. In cases of suspected meningitis, the most common reason for a lumbar puncture is to collect cerebrospinal fluid [2,3,4]. However, it may be used to diagnose other neurological issues including subarachnoid hemorrhage and hydrocephalus and benign intracranial hypertension [5].

LP is contraindicated in patients with an intracranial mass or other indications of elevated intracranial pressure; hemodynamic dysfunction, such as respiratory compromise, status epilepticus, any underlying spinal cord anatomic defects, coagulopathy, or spinal or epidural abscess; or an inflammation of the superimposing lumbar region, such as cellulitis or skin or subcutaneous abscess [6,7].

Use of a small gauge, 22G atraumatic needle to obtain adequate CSF on the first attempt with minimal pain and without any trauma, CSF must contain 1000 red blood cells per high powered area, and to reduce the risk of complications such as post-LP headache and cerebral herniation [8].

The procedure and risks should be explained to the patient and informed consent should be obtained. There has never been a study that looked at the effect of patient positioning [9,10,11]. Spinal hematomas and post-lumbar puncture headache are uncommon complications of LP [12]. However, it's still unclear if there are certain factors that increase the likelihood of these events, or if surgical intervention improves outcome.

In 2016, a report was conducted to assess the literature for cases of spinal hematoma and subsequent intervention after 1974. Patients with coagulopathy have a worse prognosis than healthy people, according to this report [13]. Another prospective study examined local rates of LP complications and risk factors, especially post-dural puncture headache (PDPH). The findings revealed that these complications are uncommon in Singapore. This could be due to the audit enhancing adherence to best practices [14], or it could be setting specific.

Research published in 2019 looked at the risk factors for the occurrence of post-lumbar puncture headaches, as well as the treatments used to avoid and alleviate them [15]. It also found that using an atraumatic needle decreased total costs when compared to traditional needles [16]. While LP has a high diagnostic and therapeutic value, many parents refuse to have it done on their children. According to a study conducted in Kuwait, 78.1 percent of parents believe the LP is a risky procedure, 14.2 percent believe it is healthy, and 6.4 percent are unsure [17].

In KSA, 44.3 percent of parents in a study conducted in Makkah, Abha, and Riyadh, Saudi Arabia, declined to have their children undergo the LP treatment. Fear of side effects such as paralysis, as well as a lack of knowledge

about the utility of LP in the diagnosis and treatment of infants, were the key reasons for refusal. In the therapy for such diagnostic tests, it is important to educate parents [18]. According to a previous study conducted in Dammam, Saudi Arabia, 24% of parents believe LP is not permissible in society [19]. The aim of this study is to assess the misunderstanding regarding LP among parents in Taif city. As there has been no similar study done in Taif city, KSA, this study aimed to assess the misunderstanding regarding LP among parents in Taif city.

## Methods

**Study design:** a cross sectional study done.

**Study participants:** The inclusion criteria were all parents of children who required LP procedure from birth till the age of 18 in Taif Children Hospital from January 2020 to May 2020. And the exclusion criteria were anyone who refused to share their data in this research.

**Data collection instrument:** a questionnaire was used for data collection and consisted of two parts. The first part included items about participants' demographic information and the second part included items about ever been asked to take a sample of the cerebrospinal fluid (LP) of one of parents' children and circumstances related to this event. In addition, parents were asked the following two questions: "have you ever been asked to take a sample of the cerebrospinal fluid of one of your children?", and "If you were not asked before, if it was needed to take a sample of the cerebrospinal fluid of one of your children, will you agree?"

**Ethical considerations:** ethical approval for the study was obtained from the research ethics committee of Taif university.

**Statistical analysis:** Data were analyzed using the SPSS6. Qualitative data was expressed as numbers and percentages and Chi-squared test ( $\chi^2$ ) was used to test the relationship between variables. Quantitative data was presented as mean and standard deviation (Mean  $\pm$  SD) and Mann-Whitney was applied for non-parametric variables. A p-value less than 0.05 was considered as statistically significant.

## Results

Table 1 shows that 66.3% of those who filled out the questionnaires were children's mothers and 67.4% had Saudi nationality. For fathers, their mean age was  $40.17 \pm 9.55$  years and 62.5% had a university level of education. For mother, the mean age was  $37.26 \pm 9.54$  years and 78.6% had a university level of education.

Table 2 shows that only 15.7% (No.108) were asked to take a sample of the cerebrospinal fluid of one of their children, of whom, 61.2% (No. 66) agreed to it. For those who agreed, the mean age of the child at the LP was

2.24 ± 3.28 years. For 37.8% of parents a consultant explained this procedure to them and 86.5% and 56.2% reported that the doctor explained the nature and the complications of LP procedure to them.

Figure 1 illustrates that 15.7% of the participants were asked to take a sample of the cerebrospinal fluid of one of their children and 61.2% agreed to it. For those who were not asked before, 41.4% reported that they will not agree to do LP if indicated in the future.

Figure 2 shows that for those who disagreed to do LP to their children when it was indicated and those who will disagree if indicated in the future, the most common causes of refusal were: Side effects such as paralysis (60.6%), followed by pain (11.3%) and no trust in HCWs and fear of medical errors (10.9%). For them, the most common sources of refusal were information from friends and relatives (41.2%), and data from the social media and internet and personal experience (19.8%) (Figure 3).

Tables 3 and 4 shows that a non-significant relationship was found between previous agreement to do LP or future agreement to do LP if indicated and participants' characteristic ( $p \rightarrow 0.05$ ).

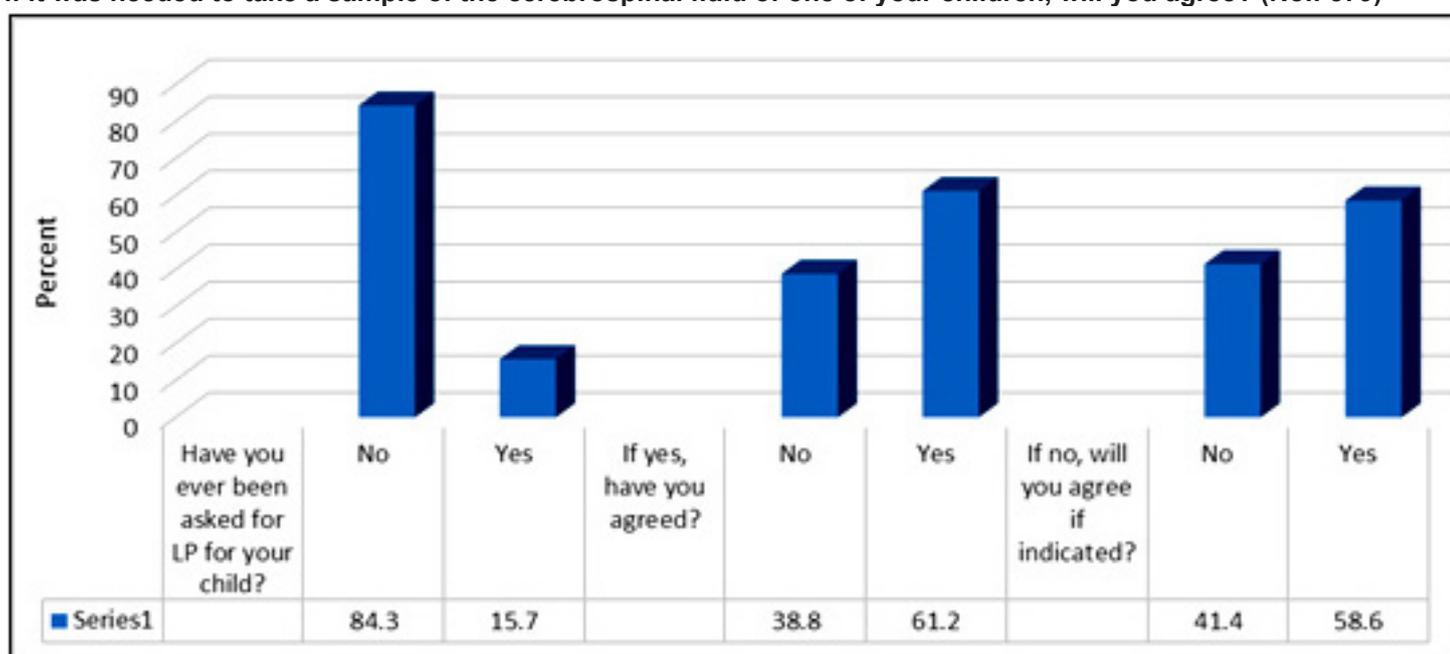
**Table 1. Distribution of the studied participants according to their characteristics (No.:687)**

| Variable                    | No. (%)      |
|-----------------------------|--------------|
| Guardian                    |              |
| Father                      | 232 (33.7)   |
| Mother                      | 455 (66.3)   |
| Nationality                 |              |
| Saudi                       | 446 (67.4)   |
| Non-Saudi                   | 12 (48)      |
| <b>Fathers' information</b> |              |
| Age (mean ± SD)             | 40.17 ± 9.55 |
| Educational level           |              |
| Elementary                  | 5 (2.1)      |
| Middle                      | 8 (3.4)      |
| Secondary                   | 28 (12)      |
| University                  | 145 (62.5)   |
| Postgraduate                | 46 (20)      |
| Nationality                 |              |
| Saudi                       | 216 (32.6)   |
| Non-Saudi                   | 13 (52)      |
| <b>Mothers' information</b> |              |
| Age (mean ± SD)             | 37.26 ± 9.54 |
| Educational level           |              |
| Elementary                  | 9 (1.9)      |
| Middle                      | 2 (0.4)      |
| Secondary                   | 62 (13.6)    |
| University                  | 358 (78.6)   |
| Postgraduate                | 27 (5.5)     |

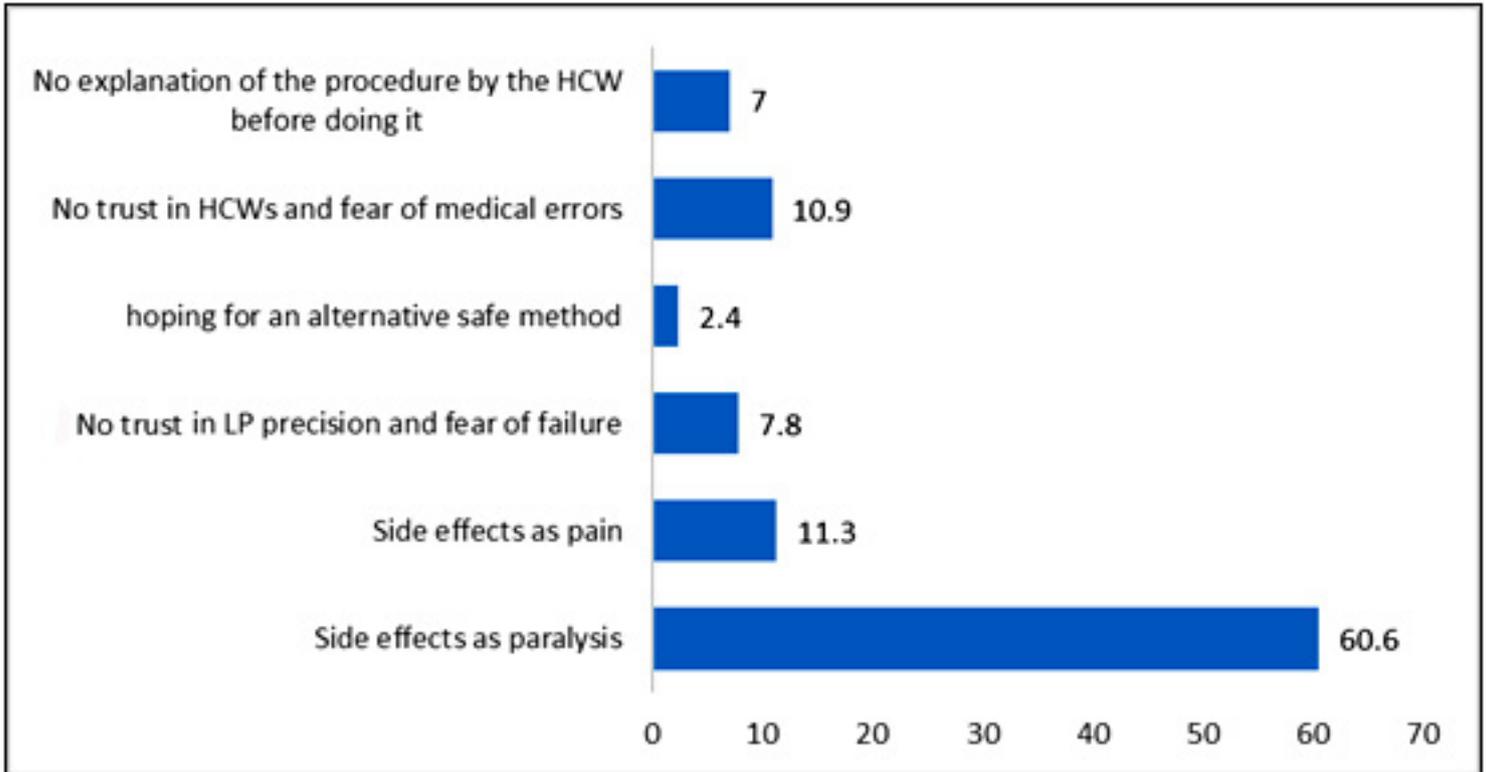
**Table 2. Distribution of the studied participants according to ever been asked to take a sample of the cerebrospinal fluid (LP) of one of their children and circumstances related to this event**

| Variable  | No. (%)         |
|---|-----------------|
| Have you ever been asked to take a sample of the cerebrospinal fluid of one of your children? (No.:687)           |                 |
| No  | 579 (84.3)      |
| Yes   | 108 (15.7)      |
| If you were asked to, have you agreed? (No.:108)  |                 |
| No  | 42 (38.8)       |
| Yes   | 66 (61.2)       |
| For those who were asked to take a sample of the cerebrospinal fluid of one of their children and agreed (No.:66) |                 |
| Child age at LP (mean $\pm$ SD)   | 2.24 $\pm$ 3.28 |
| Qualification of the doctor who explained this procedure to you (No.:66)  |                 |
| Specialist  | 24 (36.3)       |
| Consultant  | 25 (37.8)       |
| Resident  | 3 (4.5)         |
| I do not remember   | 14 (21.4)       |
| Did the doctor explain to you the nature of the LP procedure? (No.:66)  |                 |
| No  | 5 (7.5)         |
| Do not remember   | 4 (6)           |
| Yes   | 57 (86.5)       |
| Has the doctor explained to you the complications of this procedure <sup>‡</sup> (No.:66)                         |                 |
| No  | 24 (36.3)       |
| Do not remember   | 5 (7.5)         |
| Yes   | 37 (56.2)       |

**Figure 1. Percentage distribution of the participants according to their response to: “have you ever been asked to take a sample of the cerebrospinal fluid of one of you children? (No. 687)”, and “If you were not asked before, if it was needed to take a sample of the cerebrospinal fluid of one of your children, will you agree? (No.: 579)”**



**Figure 2. Percentage distribution of the cause of LP refusal for those who disagreed to do LP to their children when it was indicated and those who will disagree if indicated in the future (No:282)**



**Figure 3. Percentage distribution of the sources of LP refusal for those who disagreed to do LP to their children when it was indicated and those who will disagree if indicated in the future (No:282)**

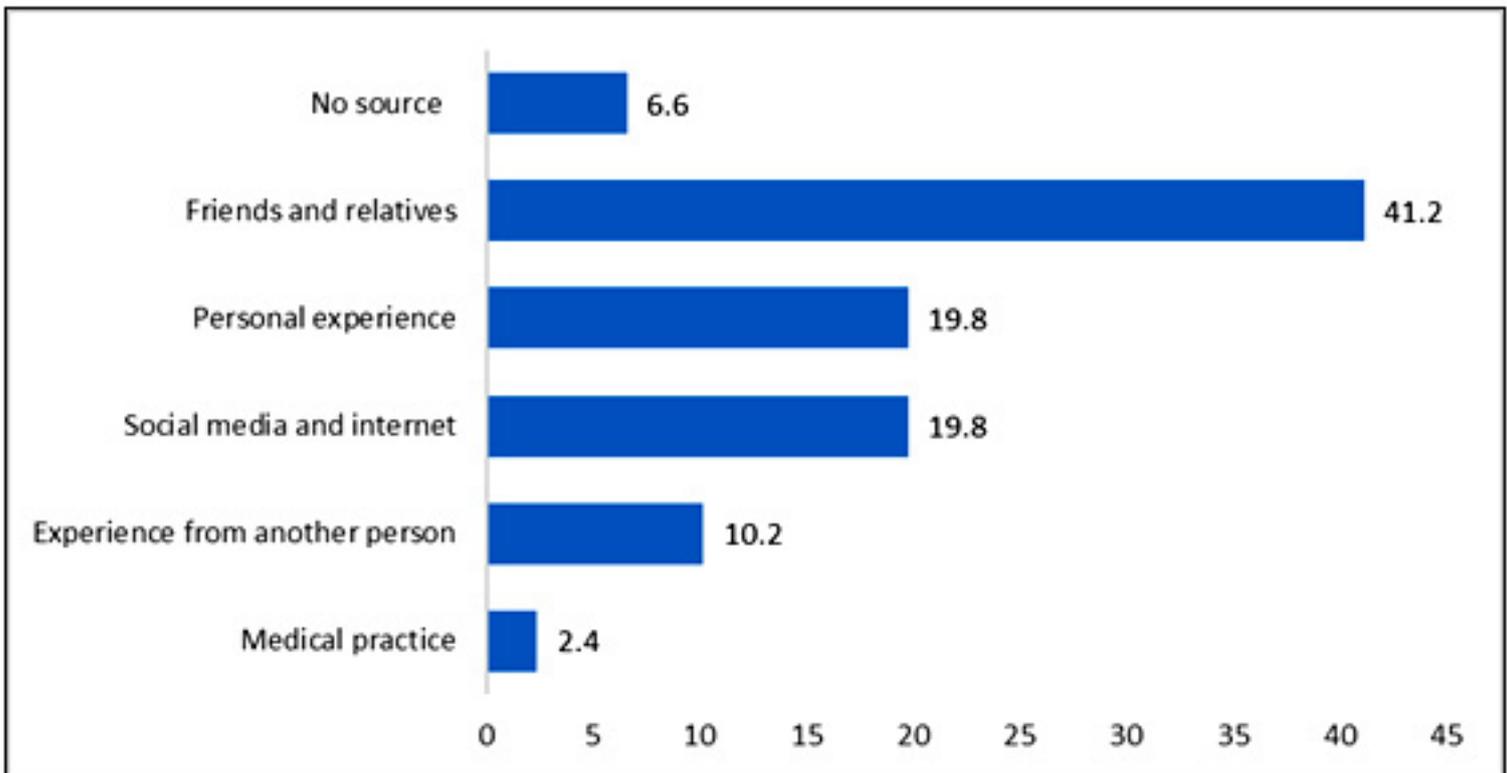


Table 3. Relationship between previous agreement to do LP and participants' characteristics

| Variable                    | Agreed<br>No. (%) | Did not agree<br>No. (%) | $\chi^2$ | p-value |
|-----------------------------|-------------------|--------------------------|----------|---------|
| <b>Fathers' information</b> |                   |                          |          |         |
| Age                         | 43.5 ± 10.74      | 41.25 ± 8.83             | 0.5      | 0.521   |
| <b>Educational level</b>    |                   |                          |          |         |
| Elementary                  | 3 (100)           | 0 (0.0)                  | 7.46     | 0.188   |
| Middle                      | 2 (50)            | 2 (50)                   |          |         |
| Secondary                   | 0 (0.0)           | 3 (100)                  |          |         |
| University                  | 16 (66.7)         | 8 (33.3)                 |          |         |
| Postgraduate                | 3 (50)            | 3 (50)                   |          |         |
| <b>Mothers' information</b> |                   |                          |          |         |
| Age                         | 39.29 ± 9.49      | 37.71 ± 8.69             | 0.77     | 0.439   |
| <b>Educational level</b>    |                   |                          |          |         |
| Elementary                  | 3 (100)           | 0 (0.0)                  | 8.28     | 0.141   |
| Middle                      | 0 (0.0)           | 1 (00)                   |          |         |
| Secondary                   | 8 (80)            | 2 (20)                   |          |         |
| University                  | 31 (58.5)         | 22 (41.5)                |          |         |
| Postgraduate                | 0 (0.0)           | 2 (100)                  |          |         |

Table 4. Relationship between future agreement to do LP if indicated and participants' characteristics

| Variable                    | Will agree<br>No. (%) | Will not agree<br>No. (%) | $\chi^2$ | p-value |
|-----------------------------|-----------------------|---------------------------|----------|---------|
| <b>Fathers' information</b> |                       |                           |          |         |
| Age                         | 40.34 ± 9.87          | 38.56 ± 8.57              | 0.91     | 0.362   |
| <b>Educational level</b>    |                       |                           |          |         |
| Elementary                  | 2 (100)               | 0 (0.0)                   | 8.74     | 0.12    |
| Middle                      | 2 (50)                | 2 (50)                    |          |         |
| Secondary                   | 8 (72)                | 7 (28)                    |          |         |
| University                  | 68 (56.2)             | 53 (43.8)                 |          |         |
| Postgraduate                | 30 (75)               | 10 (25)                   |          |         |
| <b>Mothers' information</b> |                       |                           |          |         |
| Age                         | 37.41 ± 9.92          | 36.4 ± 9.09               | 0.9      | 0.368   |
| <b>Educational level</b>    |                       |                           |          |         |
| Elementary                  | 2 (33.3)              | 4 (66.7)                  | 8.11     | 0.15    |
| Middle                      | 1 (100)               | 0 (0.0)                   |          |         |
| Secondary                   | 33 (63.5)             | 19 (36.5)                 |          |         |
| University                  | 173 (56.9)            | 131 (43.1)                |          |         |
| Postgraduate                | 10 (40)               | 15 (60)                   |          |         |

## Discussion

In numerous neurological disorders, the LP procedure is a useful diagnostic tool, as well as an important aesthetic and therapeutic indication. It's frequently utilized in emergency rooms to detect CNS diseases [20,21].

The purpose of this study is to determine whether parents in Taif have any misconceptions about LP. Because no analogous study had been conducted in Taif, Saudi Arabia, this study sought to determine the extent to which parents in Taif were misinformed about LP.

Even though LP is commonly performed in the pediatric population, patient caregivers refuse 30 percent of LPs [22]. In the current study, 38.8% of parents who were requested to collect a sample of their child's cerebrospinal fluid refused.

The most common reasons for LP refusal, according to the study, were adverse effects such as paralysis (60.6 %), pain (11.3 percent), lack of faith in HCWs, and fear of medical errors (10.9 %). Previous research has revealed a wide range of reasons for the procedure's refusal. Most of the denials were due to misunderstandings that had propagated throughout the society [23,24].

A prior survey conducted in Dammam, Saudi Arabia, found that 24% of parents felt LP is not acceptable in society [19].

This research investigated the knowledge, attitude, and perception to find the gap from where these misconceptions arise. Of the study participants, 37.8% of parents reported that the consultant explained this procedure to them and 86.5% and 56.2% reported that the doctor explained the nature and the complications of LP procedure. Previous studies on this issue in different settings have found that the public lacks an appropriate level of knowledge about LP [25].

### Limitations

Being a cross-sectional study revealed the association between studied variables but not the causal relationships.

## Conclusion

Only 15.7% of parents were asked to collect a sample of their child cerebrospinal fluid, of them 61.2 % accepted. A consultant discussed the LP technique to 37.8% of them, and 86.5% and 56.2% said the doctor clarified the nature and complications of the treatment. The main causes of LP refusal were the side effects such as paralysis, pain, and lack of trust in HCWs and fear of medical errors. To remove the hurdles that contribute to LP refusal, parents must be educated about the importance and nature of LP. HCWs should have a role in this education to overcome the knowledge gaps and can provide a better awareness of the dangers involved, the key indications, and the treatment options.

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