

ORIGINAL ARTICLE

A NEW CLINICAL SIGN IN MENINGITIS-JAMIL'S SIGN

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Background: This study explored a new clinical sign in meningitis: neck stiffness in lateral position, also known as Jamil's sign. **Methods:** A patient was placed in the left lateral position. The examiner held the patient's occiput with his left hand and the chin with his right hand. Then, the examiner performed a manoeuvre by fully extending and then fully flexing the neck. By doing so, the examiner was able to get ample time and range of movement to judge the tone. The tone was assessed during flexion and extension. If the examiner felt resistance, rigidity, or stiffness while performing this manoeuvre, Jamil's sign was present. Otherwise, it was supple, and Jamil's sign was absent. **Results:** Of the 419 patients, Jamil's sign was present in 362 patients and absent in 57 patients. Upon lumbar puncture, 361 patients had meningitis, and 58 patients did not have meningitis. Among patients with meningitis, Jamil's sign was present in 357 patients and absent in four patients. Jamil's sign had a sensitivity of 98.89% and a specificity of 91.38%. **Conclusion:** Due to its high sensitivity and specificity for the diagnosis of meningitis, Jamil's sign obviates the need for unnecessary lumbar puncture, which is performed in doubtful situations of neck stiffness in the supine position

Keywords: Neck Stiffness; Lumbar Puncture; Meningitis

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INTRODUCTION

Meningitis is the inflammation of the meninges.¹ Patients in extremes of age (<5 or >60 years) and patients with diabetes are at an increased risk for meningitis. Immunocompromised patients, post-splenectomy patients, and patients who abuse intravenous drugs, among others, have been identified at an increased risk of meningitis. Symptoms, including headache, photophobia, and nuchal rigidity, among others, constitute meningitis clinically.² The duration of symptoms classifies meningitis as acute or chronic.³ Based on aetiology, meningitis can be aseptic, granulomatous, or bacterial.⁴ Bacterial or viral infections via the blood are the most common cause of meningitis.^{5,6} Approximately 4100 cases and 500 deaths are reported from bacterial meningitis in the United States.⁷ An estimated 23000 children die of bacterial meningitis in Pakistan making it a major cause of child mortality.⁸

Neck stiffness (NS), alongside Brudzinski's sign and Kernig's sign, is one of the clinical signs of meningitis. NS, in patients presenting with signs and symptoms consistent for meningitis, has a sensitivity of 64% and a specificity of 70% in the diagnosis.⁹ To check NS, the examiner holds the occiput and flexes the neck in a manner to bring the chin toward the chest while noting the resistance during flexion and

extension.¹⁰ Cervical spondylosis and patients admitted for other medical problems can present with NS.¹¹ It is because of gravity that the patient involuntarily resists flexion. Similarly, there is inter-observer variation in the interpretation of NS.

The author introduces a new clinical sign, NS in lateral position (NSLP), named as Jamil's sign after the principal author, Dr. Shahid Jamil. NSLP is based on more than 30 years of clinical experience of the principal author, along with publications on the subject.^{12–14} The patient is placed in the left lateral position (left or right lateral, depending on the examiner's preference). The head and neck are lying comfortably on the examination couch (gravity eliminated). The examiner holds the patient's occiput with his or her left hand and the chin with the right hand. Then, the examiner performs the manoeuvre by fully extending and then fully flexing the patient's neck. The range of movement should ideally make the chin touch the sternum. By doing so, the examiner gets ample time and range of movement to judge the tone. The tone is assessed during both flexion and extension. If the examiner feels resistance, rigidity, or stiffness while performing this manoeuvre, Jamil's sign is present. When the neck is found to be supple, Jamil's sign is absent ([Video 1](#)).

NSLP, or Jamil's sign, removes the effect of gravity, and false positivity is low with this sign. It is, more importantly, used in difficult

situations when there is doubt about NS in the supine position. Our study found Jamil’s sign to be more than 90% sensitive and specific. This, however, greatly depends on the person performing the examination and is a clinical skill learned and developed over time. Similarly, there is interobserver variation in the interpretation of NS. The aim of our study was to check the validation of Jamil’s sign.

MATERIAL AND METHODS

A descriptive cross-sectional study was performed in the Department of Medicine at Khyber Teaching Hospital in Peshawar from January 2017 to December 2019. Inclusion criteria included patients older than age 13, of both sexes, with fever, new-onset headache, and decreasing level of consciousness. Exclusion criteria included patients with focal neurological deficits, seizures, mental retardation, as well as paediatric patients. A nonprobability convenience sampling technique was used. NSLP was checked for every patient followed by a lumbar puncture after written informed, voluntary consent was obtained. Jamil’s sign was performed with the method explained in the Introduction section. If the examiner felt resistance, rigidity, or stiffness while performing this manoeuvre, Jamil’s sign was present. When the neck was found to be supple, Jamil’s sign was

absent. Cerebrospinal fluid (CSF) samples were sent to the hospital laboratory for microscopy and biochemistry workup. Patients with CSF cells count above five per high power field, and CSF protein above 45 mg/dL were included in the meningitis group. The rest were in the nonmeningitic illness group (Table-1). The Institutional Review and Ethics Board approved the study. All information was recorded using proforma and analysed on IBM SPSS Statistics for Windows, Version 26.0. (Armonk, NY: IBM Corp.).

RESULTS

Mean and standard deviations for age were recorded as 34.5±20.1. Of 419 patients, 200 were women, and 219 were men. Two hundred seventy patients were from rural areas, and 149 were from urban areas. Of 419 patients, Jamil’s sign was present in 362 patients and absent in 57 patients. Upon lumbar puncture, 361 patients were diagnosed with meningitis, while 58 patients did not have meningitis. Among patients with meningitis, Jamil’s sign was present in 357 patients and absent in four patients (Table-1). Jamil’s sign sensitivity was 98.89%, and specificity was 91.38%. The positive predictive value was 98.62%, and the negative predictive value was 92.98% (Table-2).

Table-1: The presence and absence of Jamil’s sign in meningitis and non-meningitis illness groups

Neck Stiffness in Lateral Position (Cross-Tabulation)				
		Non-Meningitis Illness	Meningitis	Total
Neck stiffness in lateral position (Jamil’s sign)	No	53	04	57
	Yes	05	357	362
	Total	58	361	419

Table-2: Jamil’s sign sensitivity, specificity, positive predictive value, and negative predictive value

Statistic	Value	95% CI
Sensitivity	98.89%	97.19–99.70%
Specificity	91.38%	81.02–97.14%
Positive predictive value*	98.62%	96.86–99.40%
Negative predictive value*	92.98%	83.29–97.24%
Accuracy*	97.85%	95.96–99.01%

*Dependent on disease prevalence. Abbreviation: CI, confidence interval

DISCUSSION

In this study, we introduced a new clinical sign known as NSLP or Jamil’s sign in patients with meningitis. Jamil’s sign has a sensitivity of 98.89% and a specificity of 91.38%. In comparison, a study concluded that in NS, Brudzinski’s sign and Kernig’s sign have a sensitivity of 70% and 14.3%, respectively.¹⁵ Another study showed that NS has a sensitivity of 64.4% in patients with meningitis.¹⁶ Studies conducted in the late 1990s demonstrated that Kernig’s and Brudzinski’s signs have a

sensitivity of 5% and a specificity of 95%.⁷ A late 1990s study concluded that NS has 70% sensitivity in patients with meningitis.¹⁷ Also, in 2017, a study determined the sensitivity to be 69% and the specificity to be 33% for jolt accentuation sign.¹⁸ Another study conducted in the early 1990s reported that signs of meningism were present in 54% of patients with meningitis.¹⁹ All of these studies reflect upon the validity and applicability of these veteran clinical signs. The patient’s clinical condition and prompt evaluation are of utmost importance given the risks in meningitis. A meta-

analysis concluded that physical signs are better and more reliable in comparison to the clinical history for the establishment of diagnosis.²⁰ It is interesting to note that, speaking in relative terms, both the Kernig's and Brudzinski's signs were found to be of low sensitivity but a much higher specificity²¹, whereas Jamil's sign has a sensitivity and specificity of more than 90% in patients with meningitis, which is evident from the results of our study. This could prove to be of pivotal importance given the correct application of this clinical sign. More importantly, it solves the problem of false positivity and avoids unnecessary lumbar punctures. Features of meningism follow meningeal irritation due to the reflex spasm of paravertebral muscles. NS is produced by cervical muscle spasm, while Kernig's sign is a manifestation of lumbar muscle spasm. It is worth mentioning that NS in the supine position is more of a reflex and can even be observed in comatose or semi-comatose patients. However, Jamil's sign is even applicable in such situations where not only the passive resistance to the neck movement in the supine position is removed by performing the sign in the left lateral position, but also the effect of gravity is taken out of the equation.²²⁻²⁴ The pathophysiology behind Jamil's sign could be similar to examining the tone in different parts of the body. The concept is to look for an increased tone in the neck muscles under the influence of meningeal irritation. This manoeuvre will lead to a motor response as a result of nociceptor exploitation. This motor response is gauged as NS. Jamil's sign removes the effect of gravity and passive resistance to the neck movement observed in the supine position.²²⁻²⁴

It is notable that, since this is a new clinical sign with no previous data or literature, it but could be vital if used appropriately in a competent manner. It can be put to further clinical use and trials to determine the efficacy, clinical applicability, and importance in decreasing unnecessary lumbar punctures. There is interobserver variation in the interpretation of Jamil's sign. The use of this sign in day-to-day clinical practice and adequate prospective research for patients suspected with meningitis would lead to the better understanding, application, and development of this skill.

CONCLUSION

In this study, we introduced and checked the validity of NSLP (i.e., Jamil's sign) in patients with meningitis. Due to its high sensitivity and specificity for the diagnosis of meningitis, Jamil's sign obviates the need for unnecessary lumbar puncture, which is performed in doubtful situations

of NS in the supine position. Further studies, especially clinical trials with the correct use of the technique, could demonstrate valid positive results and support the validity of and clinical need for Jamil's sign.

AUTHORS' CONTRIBUTION

SJ: Inception, Principal Author, Drafting the Research Paper. SSR: Corresponding Author, Study Design, Refining the Basic Idea and Objectives of the Research. SK: Data Collection, Literature Search, Data Assessment on SPSS. MJ: Proof Reading, Drafting.

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