



## SQUATTING POSITION VERSUS HAMSTRING STRETCH POSITION FOR EASE OF INDUCTION OF SPINAL ANAESTHESIA: RANDOMIZED CLINICAL TRIAL

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### Abstract

**Background:** The position of a patient is one of the major factor contributing to the success of neuraxial block. Poor positioning may cause repeated spinal needle insertion and increase the risk of back pain, post dural puncture headache, hematoma and neural trauma. **Aim:** To compare the Squatting position versus hamstring stretch position for ease of induction of spinal anaesthesia. **Methods:** A profile of 80 patients with ASA class 1 or 2 young (Age between 18-60years) was selected who were scheduled for surgical procedures under spinal anaesthesia in the Department of Anesthesiology Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana, Ambala after the institutional ethical committee approval and written, informed consent from the patient were included in this randomized clinical trial. **Results:** Both groups were comparable with regard to demographic details Both groups have similar frequency and percentage of patients, and the (p-value >0.05). There was a statistically significant difference in Group A and statistically no significant difference was observed in Group B in terms of the ease of identifying intervertebral space. In Group A, ease of identifying intervertebral space in 82% of patients was found to be easy and in 18% it was found to be difficult, while in Group B, 72% found was easy and 28% found was difficult. In Group A number of times needle bone contact seen was easy in 65% of patients whereas in Group B number of times needle bone contact seen easy was 42%. It tells us that Group A position ( Squatting Position ) is better than Group B position (Hamstring Stretch Position ). **Conclusion:** Our study's results suggest that adopting the squatting position is more effective than the hamstring stretch position when it comes to identifying intervertebral space, reducing the frequency of needle-bone contact, and ensuring greater patient comfort.

**Keywords:** Spinal anaesthesia, Squatting Position, Hamstring Stretch Position, spinal needle

## **Introduction:**

Patient's position is very important while administering spinal anaesthesia. The position of a patient is one of the major factor contributing to the success of neuraxial block other factors include the ease of identifying anatomical landmarks. [1] Poor positioning may cause repeated spinal needle insertion and increase the risk of back pain, post dural puncture headache, hematoma and neural trauma. [2]

The quality of positioning was defined as good or poor according to the ability to flex the spine adequately. [3] Spinal anaesthesia can be administered in different positions for e.g. sitting position, lateral position, prone position, cross-legged sitting position, squatting position, traditional sitting position and hamstring position. The aim of each position for spinal anaesthesia is to reduce lumbar lordosis, needle bone contact and making spinal puncture easier. Reduce lumbar lordosis during induction of spinal anaesthesia is a good positioning prior to the procedure. [4]

It seems that sitting position is more suitable for spinal anaesthesia as in this position landmarks are identified easily, lumbar puncture with a midline approach are much easier. But the patient feels uncomfortable maintaining a sitting position as compare to a lateral position. [5]

In squatting position the patient is sitting on the operating table with maximum extension of the knees and reduction of hips or forward bending. This position was discovered to reduce lumbar lordosis for easier spinal puncture. [6]

In hamstring stretch position the patient is sitting on the operating table his legs are along the edge of the bed and he bends forward at the hip, keeping the spine straight, neck flexed such as chin is touching the chest in such posture hamstring muscle are stretch that's why this position is known as hamstring stretch position. [7]

PDPH (Post dural puncture headache) is the most common side effect of lumbar puncture. It results in post-operative headache which is due to loss in volume of CSF from the hole which was created by spinal needle during lumbar puncture. In PDPH headache occurs in bilateral, frontal, occipital region which extends to the neck and shoulder, it may be feel like throbbing or constant in nature. Normally headache starts within 12 -72 hours of dural puncture and it diminishes by itself within 7 days or in 48 hours if treated. [8]

## **Methods:**

The study was done in the Department of Anesthesiology Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana, Ambala after the institutional ethical committee approval and written, informed consent from the patient. 80 patients with ASA class 1 or 2 young (Age between 18-60years) was selected who were scheduled for surgical procedures under spinal anaesthesia and was signed up for the review.

## **Study Groups:**

Group A: (Squatting position); 40 Patients.

Group B: (Hamstring stretch position); 40 Patients.

Patients were selected through computer-based random selection. In the pre-operative room, a patient was informed about the proposed position for their procedure and was also explain the position to the patients, and written informed consent was obtained before the procedure. All the risks and complications were explained in detail. After securing intravenous access, all the patients were preloaded with 3 ml/kg isotonic saline and attaching all standard anaesthesia monitor [Electrocardiogram, non-invasive blood pressure, saturation probe] and baseline vitals was noted for all patients. The spinal anaesthesia was given after the patient has received 3ml/kg of saline.

The spinal anaesthesia was given as per pre randomized sequence in either squatting position or hamstring stretch position under all aseptic precautions. Squatting position is a posture in which the patient's legs are folded under the arm and the backbone is bent like a hunching down position whereas the hamstring stretch position is the posture in which the patient's legs are straight on the table and the patient is sitting in hunching down position with hand placed near knees.

For the preparation of the puncture site, patient back region was painted with a povidine-iodine 10 % solution. Then after 2 minutes, use chlorhexidine solution of 2% for wiping with the help of 3 point scale, intervertebral space was identified :-

- **Easy:** Both adjacent spinous processes are palpable
- **Difficult:** One of the adjacent spinous processes is palpable
- **Impossible:** Both adjacent spinous processes are impalpable.

The block was given with 25 gauzes quincke Babcock needle of 3.8 cm in length. Injection bupivacaine will be administered by midline approach at L2-L3 or L3-L4 interspace with midline approach. In the meanwhile an anesthesiologist resident had note the patient's weight and height, as well as the ease with which the intervertebral space is identified and the number of times the needle makes contact with the bone. The block performer give the reading as easy, difficult, and impossible to palpate the lumbar spinous process.

- **Easy:** If there is 1 or 2 bone contact during lumbar puncture
- **Difficult:** If a number of bone contact is 2 to 5
- **Impossible:** If a number of bone contact  $\geq 5$  .

First of all we assess the palpation of intervertebral space and give score after it we noted down the frequency of needle bone contact, we confirmed the subarachnoid space after getting free flow of CSF in the hub of needle when we remove the stylet. Study was completed when free flow of CSF was seen. Whenever there was no CSF flow in the needle hub, we had to rotate the spinal needle up to 90 degrees, and then we wait for 5 seconds if still there is no confirmation or we didn't see the adequate flow of CSF. Then we advanced spinal needle approximately 2mm if we hited the spinal needle for more than five times, we had recorded it as failed position.

#### STATISTICAL ANALYSIS:

The Data was analyzed using SPSS (version 22) software. the association between Ease of identified intervertebral space and number of needle bone contact by using chi-square test , and Fisher Exact test, where  $p < 0.05$  was considered significant. The categorical data was analyzed using chi-square test where  $P < 0.05$  was considered significant.

#### Results:

There was no significant difference among the two groups with regard to demographic profile (p value  $> 0.05$ ) [Table 1].

**Table 1: Demographic profile among the study population**

Variable	Group A (Mean±SD)	Group B (Mean±SD)	P value
Age	45.75±9.8	39.95±13.5	0.333
Weight	64.85±8.5	65.50±12.142	0.737
BMI	26.23±3.0	26.4±3.41	0.138
Duration	70.5±27.5	113±40.5	0.099
Height	161.79±5.3	163.7±7.1	0.123

Statistically significant difference was seen in ease of identifying intervertebral space and number of times needle bone contact in both groups. The p value is less than 0.05 [Table 2].

**Table 2: Comparison between Ease of Identify Intervertebral Space and Number of Times Needle Bone Contact among the study population**

Variable	Groups	Mean±SD	P- value
Ease of identify intervertebral space	Group A	1.08±0.267	0.000
	Group B	1.45±0.504	
No. of times needle bone contact	Group A	1.10±0.304	0.000
	Group B	2.15±0.700	

**Discussion:**

The seated position is frequently used for spinal anesthesia, particularly when sensory anesthesia is required at the lower lumbar and sacral levels. Several modified sitting positions are available for this procedure. [2]

The ease of identifying the intervertebral space was found to be statistically significant between both groups (p-value 0.00), while the number of times the needle bone contact was statistically significant (p-value 0.00). In Group A, out of 36 patients, 35 had an easy needle-bone contact, while one patient experienced difficulty. Moreover, four patients encountered difficulty in identifying intervertebral space. The p value is less than 0.05. In Group B, consisting of 22 patients, needle-bone contact was found as easy for 6 patients, difficult for 10 patients, and impossible for 6 patients. Regarding the identification of intervertebral space, 1 patient was found as easy, 10 patients as difficult, and 7 patients as impossible out of 18 patients evaluated. These results suggest that the squatting position was superior to the hamstring stretch position, as ease of identifying intervertebral space is easy and the number of needle bone contact was significantly lower.

Similar results were found in previous studies, such as Soltani Mohammadi et al. compared the traditional sitting position and squatting position for ease of spinal needle placement and space identification under spinal anesthesia. They found no difference in space identification between the two groups and number of times needle bone contact was lower in squatting position. [4] Their results regarding space identification and the number of times the needle bone contact were similar to our study.

M.O.Ozhan et al.compared three different sitting positions to determine which was most effective in reducing needle-bone contact during combined spinal epidural anaesthesia. They found no statistically significant difference in space identification and needle bone contact in all three groups. [1]

Soltani Mohammadi et al.compared three different modified sitting positions for ease of identifying intervertebral space and number of times needle bone contact. They found no statistically significant difference was seen in space identification and number of times needle bone contact between all three groups . [6]

Overall, our study found that identifying the intervertebral space and number of times needle bone contact was easier in all patients when they were in a squatting position as compared to hamstring stretch position with statistically significant difference among the two groups. However there are few limitation In our study that we did not evaluate the level of subarachnoid block, hemodynamic alterations during spinal anesthesia and post dural puncture headache. Further research is required to determine the impact of these factors on the outcome.

**Conclusion:**

Our study's results suggest that adopting the squatting position is more effective than the hamstring stretch position when it comes to identifying intervertebral space, reducing the frequency of needle-bone contact, and ensuring greater patient comfort. Therefore, based on our findings, we recommend adopting the squatting position while administering spinal anesthesia.

**Conflict of interest:** Nil

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