Isobaric Bupivacaine versus Hyperbaric Bupivacaine for Spinal Anaesthesia in Caesarean Sections: Prospective Randomized Clinical Trial

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Spinal anaesthesia (SA) is used for cesarean sections due to its rapid onset, effective sensory blockage, and low risk of maternal and neonatal risks. Bupivacaine, the preferred local anaesthetic, is available in isobaric (dextrose-free) and hyperbaric (dextrose-containing) forms. Hyperbaric bupivacaine is preferred more for its predictable spread and cardiovascular stability, though isobaric may be a good second line choice in resource limited settings. This single-blinded, prospective, single-centered, randomized clinical trial was conducted in Teaching Hospital Peradeniya enrolling 158 pregnant women undergoing elective caesarean sections, above 18 years of age (79 in each group). Primary objectives were to compare safety, effectiveness, and cardiovascular stability (blood pressure) of isobaric and hyperbaric bupivacaine in spinal anesthesia for cesarean sections. Data were analyzed using SPSS 26 and jamovi 2.6.26, with significance set at $p < 0.05$. Data analysis revealed isobaric bupivacaine had a significantly faster onset compared to hyperbaric bupivacaine (2.101 vs. 3.763 min, $p < 0.05$). The duration of the sensory block was prolonged in hyperbaric bupivacaine than isobaric (3.80 vs. 1.622 hours, $p < 0.05$). Sensory block levels were comparable (T6 vs. T5, $p < 0.05$). A statistically significant difference was observed in both groups. Hyperbaric bupivacaine had a smaller reduction in systolic (24.10 ± 22.4 mmHg) and diastolic (19.60 ± 19.6 mmHg) blood pressure in contrast to isobaric (39.82 ± 22.4 mmHg and 30.30 ± 16.9 mmHg, respectively, $p < 0.05$). In conclusion, hyperbaric bupivacaine has better cardiovascular stability and a longer duration, making it ideal for cesarean sections. Isobaric has a faster onset but may cause more hemodynamic variations requiring close monitoring.

Keywords: Spinal anesthesia, isobaric vs. hyperbaric bupivacaine, cesarean section