Original Article

# Influence of anaesthetic technique on maternal and foetal outcome in category 1 caesarean sections – A prospective single-centre observational study

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## ABSTRACT

**Background and Aims:** In category 1 caesarean section (CS), there is limited evidence regarding superior anaesthetic technique. Hence, this study was designed to study the influence of anaesthetic technique on the maternal and foetal outcome. **Methods:** Patient characteristics, indication for CS, decision-to-delivery interval (DDI), uterine incision-to-delivery time (UIDT), cord blood pH, Apgar scores and neonatal and maternal outcome were noted. Composite endpoint (Apgar score <7, umbilical cord blood pH <7.2, neonatal intensive care unit admission or death) was created for adverse neonatal outcome. Logistic regression was done to assess the influence of confounding factors on the occurrence of adverse neonatal outcome. **Results:** Of 123 patients who underwent category 1 cesarean section, 114 patients were included for analysis. The DDI and UIDT were comparable. One and 5-min Apgar scores were significantly lower in the group general anaesthesia (GA) than in the group spinal anaesthesia (SA). The umbilical cord blood pH was comparable (7.21 ± 0.15 vs 7.25 ± 0.11 in groups GA and SA, respectively). Neonatal intensive care admission and maternal outcome were comparable in both the groups. Subgroup analysis of patients with foetal heart rate of less than 100 showed that group GA had significantly lower 1-min Apgar scores and umbilical cord blood pH and significantly more neonatal admission and mortality. Binominal logistic regression showed that group GA (odds ratio 2.9, 95% confidence intervals 1.27-6.41) and gestational age were independently associated with adverse neonatal outcome. **Conclusion:** GA for category 1 CS was associated with increased incidence of adverse neonatal outcome.

**Key words:** Emergency caesarean section, foetal distress, foetal heart rate, general anaesthesia, maternal mortality, neonatal mortality, spinal anaesthesia

## INTRODUCTION

Spinal anaesthesia (SA) is the preferred technique for elective and emergency caesarean section (CS). Since long, it is assumed that CS under SA results in better maternal and neonatal outcome, but clinical trials suggest otherwise.[1] However, a meta-analysis performed by Afolabi and Lesi for both elective and emergency CS did not show any evidence for the superiority of SA over general anaesthesia (GA).[2]

The indications for CS have been classified into four categories depending on the maternal and foetal factors.[3,4] Category 1 CS should be performed as early as possible, within 30 min of decision, as there is immediate threat to the mother or the foetus. Anaesthetic technique for category 1 CS might vary



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depending on several factors. Even though the most commonly used technique is SA, there are some conditions where GA is preferred by the attending anaesthesiologist. Randomised controlled trials show varying results for neonatal outcome with SA and some with GA.[5-9] Though several randomised trials have compared the maternal and foetal outcome between these two anaesthetic techniques, the studies with respect to category 1 CS are limited. We hypothesised that SA is superior to GA in terms of maternal and neonatal outcome for category 1 CS. Hence, this prospective observational study has been designed to study the influence of anaesthetic technique on the maternal and foetal outcome in category 1 CS. The primary objective was to study the neonatal outcome and the secondary objective was to study the maternal outcome.

## METHODS

This prospective observational cohort study was conducted in a tertiary care institute and research centre in south India. Approval from the Institute's Ethics Committee was obtained. Consecutive patients more than 18 years who underwent CS for category 1 indication during the 1-year period from August 2014 to August 2015 were recruited for the study after obtaining informed written consent from all parturients. Preanaesthetic assessment was performed in the preoperative holding area or in the labour room by the attending anaesthesiologist, and intravenous (IV) ranitidine 50 mg was administered after establishing an IV access if IV line was not already secured. On the operating table, haemodynamic parameters (electrocardiogram, noninvasive blood pressure and haemoglobin oxygen saturation) were monitored for all parturients throughout the surgery according to the standard departmental protocol. The type of anaesthetic technique (GA or SA) was decided by the attending anaesthesiologist. GA was often considered for patients with foetal heart rate (FHR) less than 100, persistent deceleration pattern of FHR, suspected maternal coagulopathy, maternal sepsis, severe maternal cardiac disease and eclampsia.

For SA, all parturients were preloaded with 500 mL of Ringer's lactate. In the left lateral position, the patients' back was cleaned with povidone iodine. In the mean time, the spinal anaesthesic drug and local anaesthetic drug were prepared. After wiping povidone iodine with alcohol, 1.8 mL of 0.5% hyperbaric bupivacaine was administered intrathecally using 25 G spinal needle. Later, the patients were kept in supine position with pelvic wedge. Oxygen was administered using simple face mask till the delivery of the baby.

For GA, patients were positioned with pelvic wedge. They were then preoxygentated with four vital capacity breaths as the patients' abdomen was cleaned and draped. Then rapid sequence induction with precalculated doses of thiopentone and succinylcholine was followed by endotracheal intubation. After delivery of the baby, fentanyl and midazolam were administered. Later, anaesthesia was maintained with isoflurane in nitrous oxide oxygen mixture to achieve 0.8 minimum alveolar concentration (MAC).

Intraoperatively, all patients were administered Ringer's lactate. Blood pressure was recorded at 5-min intervals. Any blood pressure less than 20% of baseline was treated with boluses of 3 mg of mephentermine.

The time interval between the decision-to-delivery interval (DDI) and uterine incision-to-delivery time (UIDT) was noted. After the delivery of the foetus, the operating obstetrician took the umbilical cord blood sample for analysis. Apgar scores at 1 and 5 min were noted from paediatrician's record. Neonates were shifted to the mother's side or neonatal intensive care unit (NICU) as advised by the attending paediatrician. If the baby was admitted to NICU, the indication and duration of stay were noted. Umbilical cord blood pH less than 7.2, Apgar at 1 min less than 7, Apgar at 5 min less than 7, admission to NICU and NICU deaths were considered predictors of adverse neonatal outcome. Any perioperative complication to the mother was also noted. Postoperatively, all patients were followed for any postoperative complications and intensive care unit (ICU) admission. Patients who required respiratory monitoring, haemodynamic monitoring, need for mechanical ventilation or renal replacement therapy were shifted to the ICU. If the mother was admitted to the ICU, the reason for ICU admission, duration of mechanical ventilation, duration of hospital stay and mortality were noted.

Data were tabulated with continuous variables expressed as mean (standard deviation) and median (interquartile range). Categorical variables such as NICU admission and NICU deaths are expressed as frequency (proportions). Continuous variables were analysed using independent Student's *t*-test and Mann Whitney *U*-test. Apgar less than 7 at 1 min, Apgar less than 7 at 5 min, umbilical cord blood pH less

than 7.2, admission to NICU and NICU deaths were considered as predictors of adverse neonatal outcome. A composite endpoint variable was created for adverse neonatal outcome and the presence of any one of the above parameters was considered as adverse outcome present. Binominal logistic regression was performed with maternal age, gestational age of the foetus, type of anaesthesia, indication for CS, preoperative FHR, DDI, UIDT and presence of intrauterine growth restriction (IUGR) as covariates against the composite endpoint variable to study the influence of these parameters on the occurrence of adverse neonatal outcome. A subgroup analysis of patients with FHR less than 100 was also done to study the influence of FHR. $P < 0.05$ was considered statistically significant. Statistical tests were performed using Statistical Package for the Social Sciences (SPSS) version 22.

## RESULTS

This prospective observational study was conducted over a period of 1 year from August 2014 to August 2015. Of 1913 CSs, a total of 123 category 1 CSs were performed during the study period. Nine parturients were excluded as the cord blood gas analysis could not be done due to logistic reasons, hence data collected from 114 parturients were analysed. The mean maternal age and median gestational age were 25.64 ± 4.0 years and 38 (37–39.5) weeks, respectively. The mean birth weight of the foetus was 2809 ± 494 g.

The indications of CS are tabulated [Table 1]. In the SA ($n$ = 47) group, none of the patients had failed block. The perinatal outcome and different time intervals between the groups SA and GA are shown in Table 2. Median 1-min and 5-min Apgar scores in group GA were significantly lower when compared with group SA. The mean cord blood pH in groups GA and SA was comparable (7.21 ± 0.15 vs 7.25 ± 0.11, $P = 0.083$). A total of 34 (29.8%) neonates were admitted to NICU [24 (35.8%) in group GA and 10 (21.3%) in group SA, $P = 0.095$].

**Table 1: Indications for NICE-1 caesarean sections**

| Indications | Group GA ($n$=67) | Group SA ($n$=47) |
|---|---|---|
| Foetal distress | 31 | 25 |
| Abruption | 5 | 4 |
| MSL | 11 | 5 |
| Cord prolapse | 1 | 1 |
| Pre-eclampsia | 0 | 1 |
| PROM | 8 | 7 |
| Polyhydramnios | 0 | 1 |
| Twin gestation | 2 | 1 |
| Seizure disorder | 1 | 1 |
| IUGR | 4 | 1 |
| Chorioamnionitis | 1 | 0 |
| DKA | 1 | 0 |
| Placenta praevia | 1 | 0 |
| Placenta accreta | 1 | 0 |

GA – General anaesthesia; SA – Spinal anaesthesia; IUGR – Intrauterine growth restriction; MSL – Meconium stained liquor; PROM – Premature rupture of membrane; IUGR – Intrauterine growth restriction; DKA – Diabetic ketoacidosis

The main indication for NICU admission was respiratory distress in 27 (79.4%) neonates and the other reasons include prematurity, poor muscle tone and screening for infection [Figure 1]. The mean duration of NICU stay (2.08 ± 0.82 days in group GA vs 1.8 ± 1.03 days in group SA, $P = 0.41$) and neonatal mortality [3 (4.5%) in group GA vs 2 (4.3%) in group SA, $P = 0.32$) were comparable between the two groups. In group GA, there were two still births when compared with none in group SA. Both the babies had a preoperative FHR of 40 beats/min which suggests significant compromise and poor outcome was expected. Two parturients (3%) from group GA group were admitted in the ICU, but there was no maternal mortality in either group [Table 2].

Fifty-seven (50%) parturients underwent category 1 CS for foetal bradycardia (FHR <100 beats/min). Among these, 36 (63.2%) parturients were in group GA and 21 (36.8%) in group SA. FHR, DDI and UIDT were comparable between both the groups. However, cord blood pH was significantly lower in group GA (7.16 ± 0.17 vs 7.24 ± 0.1, $P = 0.043$). The 1-min Apgar was significantly lower in group GA when compared with group SA [7.5 (4–8) vs 8 (8–8), $P = 0.02$]. Whereas 5-min Apgar score was comparable between the groups [9 (8–9) vs 9 (9–9), $P = 0.057$]. The duration

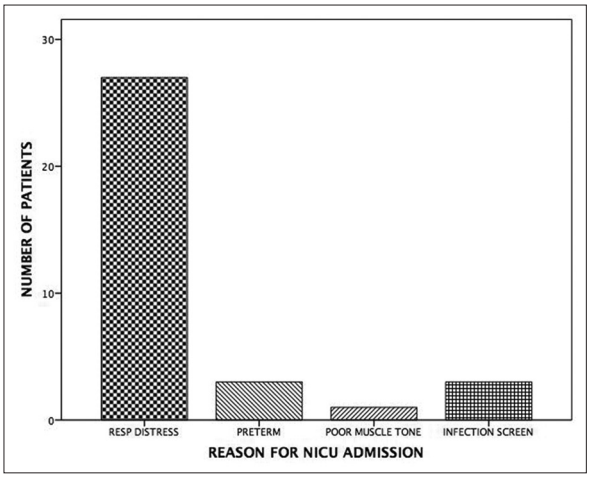


**Figure 1:** Indications for NICU admission in category 1 caesarean section

of NICU stay was significantly more in group GA than group SA (2.5 ± 0.79 vs 1.5 ± 0.57 days, $P = 0.038$). In addition, NICU mortality was significantly more in group GA when compared with group SA [3 (8.3%) vs 1 (4.8%), $P = 0.00$] [Table 3].

Fifty-one (44.7%) parturients had adverse neonatal outcome based on the composite endpoint variable (presence of Apgar <7 at 1 min or Apgar <7 at 5 min or cord blood pH <7.2 or NICU admission). Of the 51 parturients, 14 (27.4%) parturients received SA and 37 (72.5%) cases group received GA.

Fifteen patients had hypotension (MAP <20% of baseline) requiring vasopressor administration. Injection mephentermine 3 mg bolus was administered and repeated as required. There were no incidents of bradycardia requiring treatment. Two mothers had to be admitted to the critical care unit (CCU) postoperatively. One parturient had premature rupture of membranes (PROM) and sepsis and she was mechanically ventilated for 2 days; the other had diabetic ketoacidosis and she was on mechanical ventilator for 1 day, after which they were discharged to the ward. The CCU admission was because of their preexisting comorbidity and not due to any adverse event during anaesthesia and surgery. There were no other postoperative complications (need for ICU admission, hypotension requiring vasopressors, renal replacement therapy (RRT), respiratory support) in the others. There was no maternal mortality.

A binomial logistic regression was performed to ascertain the effects of maternal age, gestational age, type of anaesthesia, indication for CS, preoperative FHR, DDI, UIDT and presence of IUGR on the likelihood that

**Table 2: Response times, maternal and perinatal outcomes of NICE-1 caesarean sections performed under spinal and general anaesthesia**

| Parameter | Overall (*n*=114) | Group GA (*n*=67) | Group SA (*n*=47) | *P*-value |
|---|---|---|---|---|
| Gestational age (weeks) | 38 (37-39.5) | 38 (37-39.5) | 38.2 (37-40) | 0.547 |
| FHR (bpm)* | 98.64±24.4 | 96.68±26.34 | 101.42±21.30 | 0.310 |
| DDI (min)† | 22 (15-35) | 20 (15-35) | 23 (17-35) | 0.399 |
| UIDT (s)* | 45.44±17.10 | 43.80±16.64 | 47.78±17.65 | 0.223 |
| Cord blood pH* | 7.23±0.13 | 7.21±0.15 | 7.25±0.11 | 0.083 |
| Apgar 1 min† | 8 (6-8) | 7 (5-8) | 8 (8-8) | 0.000‡ |
| Apgar 5 min† | 9 (8-9) | 9 (8-9) | 9 (9-9) | 0.006‡ |
| Birth weight (g) | 2809±494 | 2837±493 | 2769±499 | 0.477 |
| NICU admission [*n* (%)] | 34 (29.8%) | 24 (35.8%) | 10 (21.3%) | 0.095 |
| NICU admission (days)* | 2±0.88 | 2.08±0.82 | 1.8±1.03 | 0.405 |
| NICU mortality [*n* (%)] | 5 (4.4%) | 3 (4.5%) | 2 (4.3%) | 0.317 |
| IUGR [*n* (%)] | 24 (21.1%) | 12 (17.9%) | 12 (25.5%) | 0.326 |
| Still birth | 2 (1.8%) | 2 (3%) | 0 | 1.428 |
| CCU admission [*n* (%)] | 2 (1.8%) | 2 (3%) | 0 | 1.428 |
| CCU length of stay (days) | 2±0.00 | 2±0.00 | 0 | |
| Duration of mechanical ventilation (days) | 1.5±0.7 | 1.5±0.7 | 0 | |

GA – General anaesthesia; SA – Spinal anaesthesia; FHR – Foetal heart rate; DDI – Decision-to-delivery interval; UIDT – Uterine incision to delivery interval; NICU – Neonatal intensive care unit; CCU – Critical care unit; SD – Standard deviation; IQR – Interquartile range Values are shown in *mean (SD), †median (IQR) ‡*P*-value<0.05 is considered statistically significant

**Table 3: Response times, maternal and perinatal outcomes of NICE-1 caesarean sections performed under spinal and general anaesthesia for non-reassuring foetal heart rate (FHR <100)**

| Parameter | Overall (*n*=57) | Group GA (*n*=36) | Group SA (*n*=21) | *P*-value |
|---|---|---|---|---|
| FHR (bpm)* | 78.17±12.43 | 76.27±14.19 | 81.42±7.92 | 0.133 |
| DDI (min)† | 20 (15-29.5) | 17.5 (15-30) | 21 (16-29.5) | 0.229 |
| UIDT (s)* | 44.82±19.28 | 42.63±18.2 | 48.5±20.92 | 0.266 |
| Cord blood pH* | 7.19±1.8 | 7.16±0.17 | 7.24±0.1 | 0.043‡ |
| Apgar 1 min† | 8 (5-8) | 7.5 (4-8) | 8 (8-8) | 0.020‡ |
| Apgar 5 min† | 9 (8-9) | 9 (8-9) | 9 (9-9) | 0.057 |
| NICU admission [*n* (%)] | 16 (28.1%) | 12 (33.3%) | 4 (19%) | 1.341 |
| NICU admission (days)* | 2.25±0.85 | 2.5±0.79 | 1.5±0.57 | 0.038‡ |
| NICU mortality [*n* (%)] | 4 (7%) | 3 (8.3%) | 1 (4.8%) | 0.000‡ |
| CCU admission [*n* (%)] | 1 (1.8%) | 1 (2.8%) | 0 | 0.594 |

FHR – Foetal heart rate; DDI – Decision-to-delivery interval; UIDT – Uterine incision to delivery interval; NICU – Neonatal intensive care unit; CCU – Critical care unit; SD – Standard deviation; IQR – Interquartile range. Values are shown in *Mean (SD), †Median (IQR) ‡*P*-value <0.05 is considered statistically significant

patients have adverse neonatal outcome (composite endpoint variable). Of the variables studied, only type of anaesthesia, preoperative FHR and gestational age had a *P* value of less than 0.2 in univariate analysis, and hence were included in multivariate analysis. The logistic regression model was statistically significant, $\chi^2$ (3) = 12.99, *P* = 0.005. The model explained 14% (Nagelkerke $R^2$) of the variance in occurrence of adverse neonatal outcome and correctly classified 64% of cases. However, of the three predictor variables, only the mode of anaesthesia and gestational age were statistically significant. Parturients receiving GA had 2.9 (95% confidence interval 6.41, 1.27) times more chance of having an adverse neonatal outcome compared with parturients receiving SA [Table 4].

## DISCUSSION

The observations in this study suggest that parturients receiving GA for category 1 CS had significantly low 1- and 5-min Apgar scores. Parturients receiving GA had 2.9 times more odds of having an adverse neonatal outcome compared with parturients receiving SA. Other neonatal parameters such as cord blood pH, NICU admission and neonatal mortality were comparable with both the anaesthetic techniques. The maternal parameters such as ICU admission and maternal mortality were also comparable between GA and SA. Our results were similar to Beckmann *et al.* who observed that GA for category 1 CS was found to be associated with low Apgar score at 5 min.[10] Few other studies have also reported that Apgar scores were significantly lower in neonates whose mothers received GA.[11,12]

The Apgar score may not be reflecting neonatal status, as it is subjective.[13] Umbilical venous pH is a reasonably reliable indicator of foetal well-being since large differences in the umbilical artery and venous pH may not be observed.[14] However, neonatal acid–base balance is influenced by many factors including maternal hypotension, type of vasopressor, type of anaesthesia, IV fluid loading, maternal position, uterine displacement, extent of sympathetic blockade, inspired oxygen concentration, DDI, skin incision to baby delivery, uterine incision to baby delivery and use of sedative drugs.[15] Umbilical venous blood analysis collaborated well with Apgar scores in this study, and the various compounding factors that could alter were addressed by the standard protocol of management and were therefore common to both the groups.

**Table 4: Logistic regression predicting the likelihood of adverse neonatal outcome based on gestational age, mode of anaesthesia and preoperative FHR**

| | *B* | SE | Wald | df | *P* | OR | 95% CI | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Lower | Upper |
| Gestational age | −0.196 | 0.096 | 4.141 | 1 | 0.042 | 0.822 | 0.681 | 0.993 |
| Mode of anaesthesia | −1.048 | 0.414 | 6.421 | 1 | 0.011 | 2.849 | 6.410 | 1.267 |
| FHR | −0.425 | 0.399 | 1.133 | 1 | 0.287 | 0.654 | 0.299 | 1.430 |

FHR – Foetal heart rate; SE – Standard error; OR – Odds ratio; CI – Confidence interval

In a study by Shek *et al.*, umbilical cord blood pH was comparable between SA and GA for either elective or emergency CS.[11] A meta-analysis had reported that SA was associated with significantly lower cord blood pH. The significantly lower pH with SA was attributed with the use of large doses of ephedrine.[1] However, in our institution, mephentermine was used as vasopressor in all CSs. The pH was comparable between SA and GA in our study. In contrast to this, Beckmann *et al.* observed a significantly less pH in GA group.[10] Shek *et al.* also observed that the incidence of NICU admission was similar between SA and GA groups (19.4% and 11.1%, respectively).[11] Though the incidence of NICU admission in our study was higher, it was comparable between groups GA and SA [24 (35.8%) vs 10 (21.3%), *P* = 0.095].

Since no single parameter can be used to predict adverse neonatal outcome, a composite endpoint variable was created where occurrence of any of the predictors (Apgar <7 at 1 min or Apgar <7 at 5 min or umbilical cord blood pH <7.2 or NICU admission or death) was considered as an adverse neonatal outcome. Using this composite endpoint, we observed that parturients with foetal bradycardia (FHR <100 beats/min) who received GA had a significantly higher occurrence of adverse neonatal outcome.

In all, 67 (58.8%) patients had received GA in our study. This is similar to a National survey in the United Kingdom where more than half of the patients received GA for category 1 CSs. In a case series, 30% of patients who underwent preterm CS with non-reassuring FHR received GA.[16] Laudenbach *et al.* had reported that neonatal mortality was found to be higher with GA than SA. But the adjusted odds ratio in their study revealed that SA was associated with higher neonatal mortality rate.[17]

The DDI time is controversial; however, it is universally accepted to keep DDI within 30 min. The DDI in both SA

and GA was comparable in our study, whereas Beckmann *et al.* reported a significantly shorter DDI in patients who received GA.[10] However, DDI of shorter duration may not ensure better neonatal outcome. In our study, there were two patients who had FHR of less than 40 and GA was administered with DDI less than 30 min. But still, both the patients had stillborn babies. This emphasises the fact that the DDI is an indirect indicator of assessment of infrastructure and decision-making. Furthermore, DDI of less than 30 min in category 1 CS could also have Apgar score <7 and umbilical cord pH <7.10.[18]

Our secondary outcome was to study the maternal morbidity and mortality. Two mothers received mechanical ventilation. One mother had PROM and sepsis and was on mechanical ventilation for 2 days. The other mother had diabetic ketoacidosis and hypothyroidism and was on mechanical ventilation for 1 day. Previous studies had reported maternal morbidity in terms of postoperative anaesthetic complication.[19] There are limited reports in the literature reporting the maternal morbidity in terms of ICU admission.

During GA, it may not be always possible to maintain a discrete balance between the MAC to prevent awareness in the mother and to prevent neonatal depression in an already compromised foetus. However, the anaesthesiologists invariably will try to maintain adequate anaesthetic depth in the mother which may lead to the placental transfer of anaesthetic drugs (opioids, induction agents and inhalational agents), thereby influencing the neonatal outcome.[20] The foetomaternal ratios of anaesthetic agents suggest minimal transfer across the placenta; however, in category 1 CS when the foetus is already compromised, it may be enough to cause neonatal depression.[10] Further clinical trials are required to investigate the effect of anaesthetic agents on compromised foetal state. Additionally, the existing comorbidities in the mother can also directly affect the foetus and contribute significantly to adverse neonatal outcome. SA also has few disadvantages such as inadequate sensory level, conversion to GA and difficult regional, which may prolong the DDI and consequently affect neonatal outcome. Hence, the decision to opt for SA or GA should be patient-based and according to the experience of the attending anaesthesiologist.

One of the main limitations of this study was the small sample size. Further studies with adequate sample size are needed. Few other limitations of our study were first, the authors could not collect the data regarding the details of neonatal resuscitation. The neonate could have received bag mask ventilation, oxygen therapy or tracheal intubation and ventilation. These data could have given more information with respect to neonatal outcome. Second, there might be an observer bias in the decision-making for CS, choice of anaesthesia and neonatal assessment. Even though there was departmental protocol for each of these factors, the decision of individual anaesthesiologist could have been different. The presence of experienced anaesthesiologist in the day shift could have influenced the particular factor. However, this bias was possibly ruled out as DDI was comparable in both the groups.

## CONCLUSION

We observed that GA for category 1 CS was associated with higher incidence of adverse neonatal outcome in our study. The maternal morbidity and mortality were comparable. However, further randomised controlled studies with a larger sample size are a requisite in this contentious subject.

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### Conflicts of interest
There are no conflicts of interest.

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Announcement

## CALENDAR OF EVENTS OF ISA 2017-18

The cut off dates to receive applications / nominations for various Awards / competitions 2018 is as below. Please visit isaweb.in and log in with your ISA Regd. E Mail ID & Password and submit application with all documents as attachment. Mark a copy of the same by E Mail to secretaryisanhq@gmail.com. Write the name of Award applied as subject. Link will be sent to judges for evaluation. No need to send hard copy. Only ISA members are eligible to apply for any Awards / competitions. The details of Awards can be had from Hon. Secretary & also posted in www.isaweb.in

| Cut Off Date | Name of Award / Competition | Application to be sent to |
|---|---|---|
| 30 June 2018 | Bhopal Award for Academic Excellence | Hon. Secretary, ISA (by log in & E Mail) |
| 30 June 2018 | Late Prof. Dr. A .P. Singhal Life Time Achievement Award | Hon. Secretary, ISA (by log in & E Mail) |
| 30 June 2018 | Rukmini Pandit Award | Hon. Secretary, ISA (by log in & E Mail) |
| 30 June 2018 | Dr. Y. G. Bhoj Raj Award | Hon. Secretary, ISA (by log in & E Mail) |
| 30 June 2018 | Mrs. Shashi & Dr. P Chandra Award | Hon. Secretary, ISA (by log in & E Mail) |
| 30 Sept. 2018 | Kop's Award | Chairperson, Scientific Committee ISACON 2018 copy to Hon. Secretary, ISA (by log in & E Mail) |
| 30 Sept. 2018 | ISACON Jaipur Award | Chairperson, Scientific Committee ISACON 2018 copy to Hon. Secretary, ISA (by log in & E Mail) |
| 30 Sept. 2018 | Prof. Dr. Venkata Rao Oration 2017 | Hon. Secretary, ISA (by log in & E Mail) |
| 30 Sept. 2018 | Ish Narani Best poster Award | Chairperson, Scientific Committee ISACON 2018 |
| 30 Sept. 2018 | ISA Goldcon Quiz | Chairperson, Scientific Committee ISACON 2018 |
| 10 Nov. 2018 | Late Dr. T. N. Jha Memorial Award & Dr. K. P. Chansoriya Travel Grant | Hon. Secretary, ISA, (by log in & E Mail) copy to Chairperson Scientific Committee ISACON 2018 |
| 20 Oct. 2018 | Bidding Application for ISACON 2020 | Hon.Secretary, ISA by log in, E Mail & hard copy |
| 20 Oct. 2018 | Awards (01 Oct 2017 to 30 Sept 2018) | Hon. Secretary, ISA (by log in & E Mail) |

(Report your monthly activity online every month after logging in using Branch Secretary's log in ID)

1. Best City Branch
2. Best Metro Branch
3. Best State Chapter
4. Public Awareness – Individual
5. Public Awareness – City / Metro
6. Public Awareness - State
7. Ether Day (WAD) 2018 City & State
8. Membership drive
9. Proficiency Awards

**Send hard copy (only for ISACON 2020 bidding) to**
Dr. Venkatagiri K.M.
Hon Secretary, ISA National
"Ashwathi"' Opp. Ayyappa temple,
Nullippady, Kasaragod 671 121.
secretaryisanhq@gmail.com / 9388030395.