Original Research Article

Blood pressure monitoring in neonates admitted to tertiary care hospital

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Abstract

Aim: Measurement of blood pressure is one of the routine practices in neonates. Hence, the aim of the study is to find the relationship between blood pressure and postnatal age, sex and birth weight. **Materials and Methods:** A total of 624 new born are excluding postnatal problems were enrolled in the study. The measurement of blood pressure is done with help of non-invasive BP monitor during the child was awake. The blood pressure is recorded continuously for 1 to 3 days and data was analysed. **Results:** Results revealed that out of 624 new born's with 220 males and 422 females. Average SBP values increases on day 2 and 3; average DBP also increases on consecutive days and same as well with MBP values. It was also found that average BP is higher in all normal birth weight neonates than low birth weight neonates on all days. There was no difference in the BP of male and female neonates. **Conclusions:** It is concluded that, BP increases as the postnatal age increases; BP was found higher in normal birth weight babies and found no relationship with sex.
Key Words: Non-invasive, birth weight, postnatal age.

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INTRODUCTION

Neonatal hypertension is the systolic blood pressure more than 95 percentile in infants [1]. The incidence of neonatal hypertension is in between 0.2% to 0.3% which is more common in term neonates admitted in neonatal intensive care units. This condition in neonates is mainly due to kidney or heart disease which exists by birth; termed as congenital disease. Common examples of congenital diseases include, Coarctation of the aorta, patent ductus arteriosus and bronchopulmonary dysplasia. Renal parenchymal and vascular diseases lie as most common neonatal diseases [2].Hypertension might also occur in infants who receive long –term total parenteral nutrition from salt and water retention. It is also noted that infants with neuroblastoma and tumour may present with hypertension in neonatal period [3]. Measurement of blood pressure in neonate is most routine practice and 1st BP measurement in neonate is done by direct determination of BP through umbilical artery in 1879. Since then, the increasing body of information on arterial blood pressure in new born has generated many novel and unanswered questions. If we accept this point of view and there is increasing evidence that clear monitoring of blood pressure is a prerequisite for successful neonatal intensive care. But the question here is what method is to be used for best diagnosis and the purpose of this annotation is to provide answers [4]. Basic measurement of BP in neonate can be of two types i. e; non-invasive and invasive. Non-invasive are easy and popular. They are palpatory, asculatory, Doppler ultra sound and oscillatory method. Invasive methods are more accurate but are less preferred due limitations.

Principle of NIBP: A transducer which measures static pressure and pressure oscillation and transmitted by cuff. Differences will take place as NIBP measures peripheral pulses and not electrical signals which fail to produce

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peripheral pulse. Variations in BP takes place in presence of short cuff/ loose cuff. Therefore selection of appropriate site is important and usually right upper limb is chosen for BP monitoring. Proper cuff size and infant comfort are the important considerations for better assessment of neonate's cardiovascular condition. Care should be taken while placing the cuff on extremity for monitoring vital sign parameters like pulse oximetry. Do not put cuff to non-intact skin [5, 6].

Selection of the proper cuff size for NIBP monitoring:

For measuring non –invasive blood pressure, cuffs should be disposable, cost effective and economical enough for single patient use. Those are latex free and available in soft white fabric material that is flexible. The accuracy of non-invasive BP measurement mainly depends on cuff size. The common cuff size should be able to cover 2/3 rd of upper arm or should be 20% more in diameter than that of limb. Bigger cuff size usually causes decrease in measurement accuracy and smaller cuff size results in greater errors with erroneously high readings. To ensure cuff size is fit and appropriate, measure the in fants limb circumference by placing a measure tape around the midpoint of the limb [7, 8].

No	MAC(cm)
1	3.2-5.5
2	4-8
3	5.4-9
4	6.9-11.7

Compare the neonate's limb circumference to the circumference ranges marked on the cuff. The cuff index line must also fall in the range of marking on the other side of the cuff. Some Non-invasive blood pressure gives different cuff sizes which fit to similar limb circumference, even though variety of width might fit different limb length. The neonate should be calm and restful throughout the measurement of BP as the movements affect the accuracy. NIBP devices sometimes lead to purpura, ischemia / neuropathy. To limit all the problems associated with it, apply the cuff properly and find the distal site to the cot off frequency for signs of blood flow [9, 10].

MATERIALS AND METHODS

The study is performed in a tertiary care hospital, Ragolu, Srikakulam. It is a prospective study done in postnatal ward of GEMS hospital for a period of December 2017 to March 2019. All the intramural neonates excluding postnatal problems were included in the study. Total neonates enrolled were 642 term patients. Blood pressure measurements were taken when the baby is awake. NIBP monitor i.e.; MEK intensive monitor MP 570 was used for the same. According to standard guidelines suitable sized cuff was used for accurate BP measurement. Site of application is also important to prevent pressure changes. Briefly to covey, cuff was connected to NIBP monitor and three readings were taken of SBP, DBP and MAP were taken on three consecutive days on day 1 to 3. The details were recorded in proforma. Statistic tests of non-parametric were applied and data was analysed by following Chi-square test and Friedman test.

RESULTS AND DISCUSSION

Out of 642 neonates studied, 220 were male and 422 were female and 524 neonates were of > 2.6 kg birth weight and 118 were of < 2.6 kg birth weight. Average values of HR, RR and BP on postnatal day of three days were n= 642.

Table 1

Parameters	Day 1	Day 2	Day 3
SBP(mm of Hg)	67.50	69.07	70.21
DBP(mm of Hg)	33.72	35.05	38.89
MAP (mm of Hg)	43.21	45.65	47.32

Average values of SBP, DBP and MAP increases with postnatal age and p value is found < 0.0001 which is highly significant. Co-ordination between BP and Birth weight

Table 2

BP(mm Hg)	Birth wt.	Day 1	Day 2	Day 3
SBP	≥ 2.6	66.23	67.42	68.31
	< 2.6	63.42	65.78	66.34
DBP	≥ 2.6	35.23	36.65	38.54
	< 2.6	31.42	33.21	34.54
MAP	≥ 2.6	45.21	47.31	49.34
	< 2.6	40.56	43.42	45.98

On the completion of evaluation, during postnatal days all the parameters tested; SBP, DBP and MAP were found to be higher in normal birth weight neonates than Low birth weight neonates and p value is found tobe significant (< 0.0001) Comparison of average values of BP in male and female neonates

Table 3

BP (mm Hg)	Day 1	Day 2	Day 3
SBP	65.2(M); 66.65(F)	66.89(M); 67.42(F)	68.23(M); 69.21(F)
DBP	35.64(M); 35. 76(F)	36.12(M); 36.89(F)	37.21(M); 38.32(F)
MAP	44.67(M); 45.56(F)	46.24(M); 47.30(F)	47.45(M); 48. 12(F)

After all observations, it is noted that on day 1 and 3, average SBP, DBP and MAP is higher in females than in comparison with males and found that p value is not significant. It was noted that on day 2, average SBP and DBP is significantly higher in females as in comparison with males but MAP is found lower in females than in males and also noted that p value is not significant.

CONCLUSIONS

It was found from the results that average values of SBP, DBP and MAP increases with increased postnatal age in first 3 days of lifespan. Average of SBP, DBP and MAP are increased in normal birth weight neonates than low birth weight neonates. Surprisingly, no relationship was found between BP and sex is established.

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