Systolic and diastolic blood pressure levels of healthy newborn infants

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Abstract

Objective: to identify normative blood pressure (BP) levels for Brazilian newborn infants and to define a cut-off point for high systolic and diastolic BP in this population.

Methods: 634 healthy term neonates, aged 12 to 36 hours, who were born in the Instituto Materno Infantil de Pernambuco (IMIP) were included in this survey. An oscillometric method was used to assess the neonates BP. To identify high BP levels the Second Task Force definition was applied.

Results and conclusions: the normative BP values for the study sample was 82.0 ± 7.5 mmHg for systolic and 41.7 ± 5.8 mmHg for diastolic blood pressure. The cut-off points for high blood pressure were > 95 mmHg and > 52 mmHg for systolic and diastolic blood pressure respectively. These results are similar to those reported in other surveys done in other countries.

Introduction

High blood pressure (HBP) is one of the main public health problems, both in poor and rich countries. In Brazil, it affects more than 20 million people and is an important factor in the increase of morbidity and mortality rates for the adult population.¹,²

Recent studies have shown that the essential or primary HBP found in adults is established in childhood. Therefore, to control HBP better, the role of the physician that works with children is fundamental, as we know that many of the risk factors for the development of HBP are already present in childhood, such as obesity, sedentary lifestyles, high salt intake, and stress.³,⁴,⁵

Low birth weight has recently been reported as an important risk factor for the development of HBP in childhood and adulthood. According to Barker, intrauterine undernourishment would result in structural and functional changes that would last for the whole life.⁶,⁷,⁸ This observation is even more relevant in poor countries, where there are large numbers of low birth-weight newborns.

However, blood pressure in the neonatal period is still very little studied, and there are difficulties to classify the levels of systolic and diastolic blood pressure (BP) considered high. In Brazil, the only study we know of is Matsuoka et al.’s, which studied BP in 35 term neonates.⁹

The objective of the present study was to check the levels of systolic and diastolic BP and estimate a cut-off point for high blood pressure in a group of healthy neonates in Recife.
Patients and Methods

We studied a group of healthy neonates born at Instituto Materno-Infantil de Pernambuco between July 1 and September 14, 1997. All the participants’ mothers were informed about the study and signed a written consent. None of them refused the consent.

Neonates included in the study fulfilled the following criteria: age between 12 and 36 hours, Apgar score equal to or higher than 7 at 5 minutes, healthy, classified as term neonates (37 to 41 weeks and 6 days) according to the Capurro scale, and appropriate for gestational age according to the Lubchenco curve.

Exclusion criteria were: prematurity or postterm pregnancies, twin gestations or the development of any disease while in the hospital.

We recruited 641 neonates, but seven were excluded (four due to infection, two with congenital malformations, and one due to persistent crying). The total number of neonate studied was 634.

The oscillometric method was used to check BP, using the DX-2710 Dixtal device. All measurements were carried out by the same researcher in a quiet room especially reserved for this study. Blood pressure was checked three times for each infant at 10-minute intervals. The neonates were awake and quiet, and their mothers were holding them. A 4-cm hose was put around their right arm.

We used the Second Task Force definition (values equal to or higher than the 95th percentile) to classify neonates' high systolic and diastolic blood pressure.

Results

We studied 335 (52.8%) boys and 299 (47.2%) girls. The average age was 20.5 hours (SD = 6.8 hours).

Table 1 shows the levels of blood pressure for the healthy neonates. According to the cut-off point, 95th percentile, 34 (5.3%) neonates had high systolic blood pressure, and 41 (6.4%), high diastolic blood pressure.

Discussion

The average systolic blood pressure (82.0 ± 7.5) in our study was slightly above what is found in medical literature, while diastolic blood pressure (41.7 ± 5.8) matched literature levels. However, several aspects should be described: the average systolic blood pressure in other studies ranged from 60.0 (± 10.0) in 1-day-old infants to 79.4 (± 12) in 3-day-old neonates (58), and the diastolic blood pressure, from 36.2 (± 8.9) to 51.5 (± 7.9) in 12-hour-old infants (58),9,11 Broad variations in the systolic and diastolic blood pressure readings were observed in these studies. Another point to consider is that some of these studies used the Doppler sonography method, while others used the oscillometric method.10-13 The Doppler technique for neonates is not very accurate in measuring diastolic blood pressure.

The Second Task Force, a report based on a large sample, found values of 72.7 (± 9.6) for boys and 71.8 (± 9.3) for girls.10 Only one reading was recorded, and the Doppler method was used. Neonates of up to 7 days of age were studied. It is important to note that several authors have reported significant BP variations for neonates during their first weeks of life.14,15

Swiet et al. reported slightly higher levels than those found by the Task Force: 77.0 (± 10) for boys and 76.0 (± 10) for girls.12 They studied 3- to 10-day-old infants, and also used the Doppler method.

Lee et al. found values of 78.8 (± 9.4) for 2- to 4-day-old infants. They also used the Doppler method, and studied only 35 infants.11 Kirkland & Kirkland studied the data for 56 1- to 2-day-old neonates, and found the value of 60 (± 10.0) also using the Doppler method.13

Park & Lee used the oscillometric method to study 140 neonates younger than 36 hours old, and found values of 62.6 (± 6.9) for systolic blood pressure, and 38.9 (± 5.7) for diastolic blood pressure.16 Gemelli et al. found 67 (± 7.0) and 37 (7.0) for systolic and diastolic blood pressure values, respectively.17

Table 1 - Systolic and diastolic blood pressure of 634 healthy neonates at Instituto Materno-Infantil de Pernambuco (1997)

<table>
<thead>
<tr>
<th>Blood pressure</th>
<th>Average (DP) (mmHg)</th>
<th>Range (mm Hg)</th>
<th>BP&gt;95% (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic</td>
<td>82 (7,5)</td>
<td>61 - 109</td>
<td>95</td>
</tr>
<tr>
<td>Diastolic</td>
<td>41.7 (5,8)</td>
<td>30 - 61</td>
<td>52</td>
</tr>
</tbody>
</table>
We did not find records in the literature reviewed (Medline, Lilacs) for neonate normative BP levels in Brazil, except for Matsuoka et al.’s study, which presented results similar to ours. They describe the evolution of systolic and diastolic blood pressure on the first 3 days of life in 35 neonates: variation between the first 12 hours and the 3rd day was from 73.6 (11.1) to 79.4 (12.1) for systolic blood pressure, and from 36.2 (± 8.9) to 41.5 (± 10.7) for diastolic blood pressure.9

It is important that new studies are carried out in Brazil to better characterize the normative levels of blood pressure for neonates. We believe that, though limited, our study has contributed to the knowledge of normative levels of blood pressure for Brazilian neonates.

References

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