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Extended Abstract
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New method for determining blood pressure in unanaesthetised rats using non-invasive CONTEC 08A device with small cuff: A path to antihypertensive drug development in developing countries

Abiola Adeosun
Lead City University, Nigeria

Invasive method of determining blood pressure has been the commonly used method in animal model of hypertension study. Currently used non-invasive blood pressure monitoring devices are very costly and unaffordable by researchers from developing or underdeveloped countries. In our study, we designed a new method for determining blood pressure in animal model studies by using CONTEC 08A device with small cuff for rats. Ten male Wistar rats of 182-240 g body weight were randomly assigned to two groups (n=5/group). A group served as control (without treatment), the second group was administered dexamethasone (2mg/kg of body weight) supplemented with 4% table salt (NaCl) as drinking water to induce hypertension. Blood pressure was measured ten times in each rat of the two groups at baseline (day 0) and after 5 days. Reproducibility (Sw) was calculated in each group. CONTEC 08A yielded good reproducibility in both hypertensive (SBP, Sw = 6 mm Hg, DBP, Sw = 10 mm Hg) and non-hypertensive rats (SBP, Sw = 3 mm Hg, DBP, Sw = 6 mm Hg). Better reproducibility was obtained in non-hypertensive rats. Consistency in data obtained showed that non-invasive blood pressure monitoring using CONTEC 08A device with small cuff is effective, and recommendable for use in rat model study of hypertension. Essential hypertension affects 95% of hypertensive patient's worldwide countries. Animal models are required to understand the physiology of essential hypertension. Intraarterial cannulation is generally considered the most physiological method of blood pressure (BP) recording in animals like rats. The procedure of arterial cannulation in small animals and to maintain the patency of arterial catheter for long time experimentation is very difficult and time consuming. Various studies have reported the strong correlation between tail-cuff and intraarterial BPs measured simultaneously in conscious rats. These comparisons have provided important validations of the BP recorded by tail-cuff method. However, there are various factors including heating and restraint that can alter the BP recorded by non-invasive methods.

Photoplethysmography (PPG), piezo plethysmography and volume pressure recording used in various non-invasive blood pressure (NIBP) techniques for measuring the BP in small animals like a rat and mice are expensive. Systolic BP can be determined by measuring the pressure value in the cuff when PPG pulse reappears during deflation. This is a simple technique and does not need calculations or formulae. In view of the above, we hypothesized that BP in rat can be measured by using pulse transducer with physiograph and an appropriate rat tail-cuff.

In this study, we recorded the systolic BP of rats by an innovated device reproducible and that correlates strongly with BP measured subsequently by NIBP machine from AD instruments (ADI) (IN125NIBP controller) Australia. This experimental design has the advantage of being simple, convenient and of low cost.

The study was conducted on albino rats (n = 6) weighing 180-250 g obtained from central animal house of King George's Medical University, Lucknow. BP was measured by two devices at 9:30 am daily for 5 days. The device was developed at the Department of Physiology KGMU, Lucknow. Study was done in accordance with the CPCSEA guidelines.

Sphygmomanometer, physiograph with coupler, pulse transducer, tramway and no collapsible rubber tubes were procured from various laboratories and inflatable raft tail-cuff was designed by the authors. The cuff consists of latex balloon measuring 5 cm × 2 cm with 0.5 mm thickness. This balloon was placed in a circular plastic case having a diameter of 23 mm with a central hole of 12 mm diameter. The balloon was kept in such a fashion that it remains in contact with an inner surface of plastic case around the central hole, so that this balloon encircles the tail. One end of the tramway related to the balloon (tail-cuff) and other two ends were connected to inflating-deflating pump and sphygmomanometer. The system measures systolic BP by determining the cuff pressure (reflected on sphygmomanometer) at which blood flow (pulse) to the

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tail was eliminated. This elimination of blood flow (pulse) was recorded by pulse transducer connected to single channel physiograph through a suitable coupler.

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