A multicenter study on home blood pressure measurement (HBPM) targeting Japanese pregnant women by the Japan Society for the Study of Hypertension in Pregnancy (JSSHP) has been ongoing since 2016. To date, over 200 pregnant women have been enrolled. This is an interim report.

Introduction

Recently, diagnosis of hypertension has shifted from conventional blood pressure (BP) measurements at a clinic (CBP) to home blood pressure measurement (HBPM) or ambulatory BP monitoring (ABPM) outside the clinical setting. Given that “white coats” are absent, HBPM is useful for diagnosing white coat hypertension (WCH). It is well-known that WCH is more prevalent in pregnant women compared to non-pregnant women. Pregnant women with WCH are more likely to develop hypertensive disorders in pregnancy (HDP) compared to those without WCH. HBPM is also useful for diagnosing masked hypertension in which BP is higher at home than in clinical settings.

Given the rapid spread of sphygmomanometers to the home, when a pregnant woman exhibits high CBP during a medical examination at an obstetric clinic, BP levels are managed by HBPM. It needs definition of hypertension using HBPM because the normal value of HBPM in the pregnant woman has not yet been established. ABPM, another non-clinical BP measurement, is considered useful for the early detection of HDP. Thus, it would be informative to determine whether HBPM is useful for the early detection of HDP.

To this end, the present multicenter study aimed to examine the utility of HBPM in normal pregnant women, and whether HBPM can be used in the early detection of HDP onset and management of HDP patients in Japan.

Subject and methods

Subjects are 400 normal pregnant women without complications who provided consent and enrolled...
in the study. Those with essential hypertension, diabetes, gestational diabetes, thyroid dysfunction, renal dysfunction, and maternal complications such as mental disorders are excluded (Figure 1).

HBPM uses a sphygmomanometer (HEM-8712, Omron Corporation, Japan) and is performed one hour before going to bed and after getting up on a daily basis from early pregnancy to three months after giving birth, to the extent possible. BP is measured twice at an interval of two minutes on the upper arm after resting for five or more minutes (at least two minutes) after urination. Caffeine intake and smoking are prohibited within 30 minutes of measurements. BP is measured using the same type of sphygmomanometer (HEM-8712) as used in the outpatient room of a clinic or hospital.

Participating and collaborative institutions include: Hokkaido University, Hirosaki University, Tohoku University, Jichi Medical School, Saitama Medical School Comprehensive Medical Care Center, Tokyo Medical College, Nippon Medical School, Juntendo University, Toyama University, 5Aichi Medical University, Fujita Hygiene Health University, Osaka University, National Cardiovascular Center, Saint Barnabas Hospital, Ehime University, Showa University, Fukui Women’s Clinic, Suzuki Hospital, Kanda Maternity Clinic, Mammy Rose Clinic, Daiyukai Hospital, and Gamagori Municipal Hospital.

The protocol of this study was approved by the Clinical Investigation Ethics Committee of Aichi Medical University and ethics committees of the participating and collaborative institutions. Informed consent is obtained from each patient prior to enrollment. HDP is retrospectively diagnosed three months after delivery according to JSSHP criteria.4) (Figure 1)

Data collection and analysis

Subjects provide HBPM data by self-report. Data are collected at the end of the study period and will be analyzed by the study secretariat at Aichi Medical University. Age, height, weight before pregnancy, parity, gestational week of delivery, and birth weight of the baby will be investigated. Changes in BP will be prospectively examined by HBPM for every week of gestation. Mean BP in the morning and before going to bed will also be calculated every week, with upper and lower limits used to obtain 1 SD, 1.5 SD, and 2 SD values (Figure 1). In the sub-analysis for BP decreases in the second trimester, the rate of BP decrease (ΔBP) will be determined, as well as the gestational week at which BP was the lowest (Figure 2). Daily BP and pulse variability will be evaluated by % coefficient of variability (CV).5)

For women who develop HDP, we will examine BP changes every gestational week and compare them to those of normal pregnant women. This will allow us to determine whether these findings can be used to predict HDP. HDP is classified as GH with hypertension only, or preeclampsia (PE) with hypertension + proteinuria until 20 weeks of gestation. When possible, we will analyze BP by HBPM for patients with GH and PE. We will also

Figure 1. Study flow.
Decrease at pregnancy (ΔBP) = baseline-minimum BP, %coefficient variability (CV) is calculated as standard deviation (SD)/mean of BP for each week.
Interim report on HBPM

Figure 2. Representative serial systolic BP from the second trimester to postpartum 12 w.

-examine associations of GH and PE with BP by HBPM when subjects visit the hospital.

Preliminary conclusion

This study can provide standard BPs by HBPM in Japanese pregnant women, allowing for the early detection of HDP onset and subsequent prevention and treatment by early intervention.

Acknowledgement

This work is supported by Intramural Research Fund (28-4-2) for Cardiovascular Disease of National Cerebral and Cardiovascular Center and by the 2015 JSSHP Foundation. We thank the following collaborators: Masahiro Ohashi, Mitsumasa Shimazu, Takuya Saitoh, Chiharu Fukue, Ai Iwasaki, Kenji Yamaguchi, Kanda Koji, Keisuke Fukui, and Hiroki Suzuki.

Conflict of interest

None.

References

1. The Japanese society of hypertension. Guidelines (JSH 2014). Hypertens Res. 2014; 37: 266–278.
2. Takagi K, Yamasaki M, Nakamoto O, et al. A Review of Best Practice Guide 2015 for Care and Treatment of Hypertension in Pregnancy. Hypertens Res in Pregnancy. 2015; 3: 65–103.
3. Brown MA, Bowyer L, McHugh L, Davis GK, Mangos GJ, Jones M. Twenty-four-hour automated blood pressure monitoring as a predictor of preeclampsia. Am J Obstet and Gynecol. 2001; 185: 618–622.
4. Watanabe K, Naruse K, Tanaka K, Metoki H, Suzuki Y. Outline of Definition and Classification of “Pregnancy induced Hypertension (PIH)”. Hypertens Res in Pregnancy. 2013; 1: 3–4.
5. Kato T, Kikuya M, Ohkubo T, et al. Factors associated with day-by-day variability of self-measured blood pressure at home: The Ohasama study. Am J Hypertens. 2010; 23: 980–986.