

Comparing Effect of Definition of Diurnal Periods by Diary, Fixed Periods, and Actigraphy on Ambulatory Blood Pressure Parameters in a Chinese Population



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Introduction

Background:

Reliable measurement of daytime and night-time blood pressure (BP), and degree of BP dipping during sleep during ambulatory blood pressure monitoring (ABPM) requires an accurate definition of sleep time (diurnal definition). However, superiority of any diurnal definition on ABPM remains unclear.

Primary aim: To compare mean daytime and night-time systolic BP (SBP) and diastolic BP (DBP) obtained by using different methods for diurnal definition: patients' diary, wide-defined and narrow-defined fixed periods, and actigraphy, in a Chinese population with diagnosed essential hypertension.

Main secondary aims: To compare different diurnal definitions on (1) the diagnosis of elevated BP and dipping status (2) reproducibility of BP parameters (3) the association with end-organ damage.

Main hypothesis: BP values, diagnosis of elevated BP and dipping status from actigraphy are different from BP obtained by other methods, have higher reproducibility and are more associated with end-organ damage.

Methods and Materials

Participants and recruitment:

From April 2017 to October 2019, 203 Chinese patients diagnosed with hypertension were recruited prospectively from Lek Yuen Clinic and 179 completed a 48-h ABPM study.

Date measurement:

- ABPM: The ApneABP monitor
- Automated clinic blood pressure measurement (AOBP): validated WatchBP office
- Patients' diary: a sleep diary mainly recording the time when patients go to bed and wake up

Data collection and analysis:

- The differences in the mean BPs were compared using paired t-tests and Bland-Altman plots.
- The prevalence of elevated BP, dipping status categories, overall percent agreement and the Kappa statistic were calculated.
- The reproducibility was also estimated.
- Logistic regression was conducted to examine the relationship between BP values and end-organ damage.

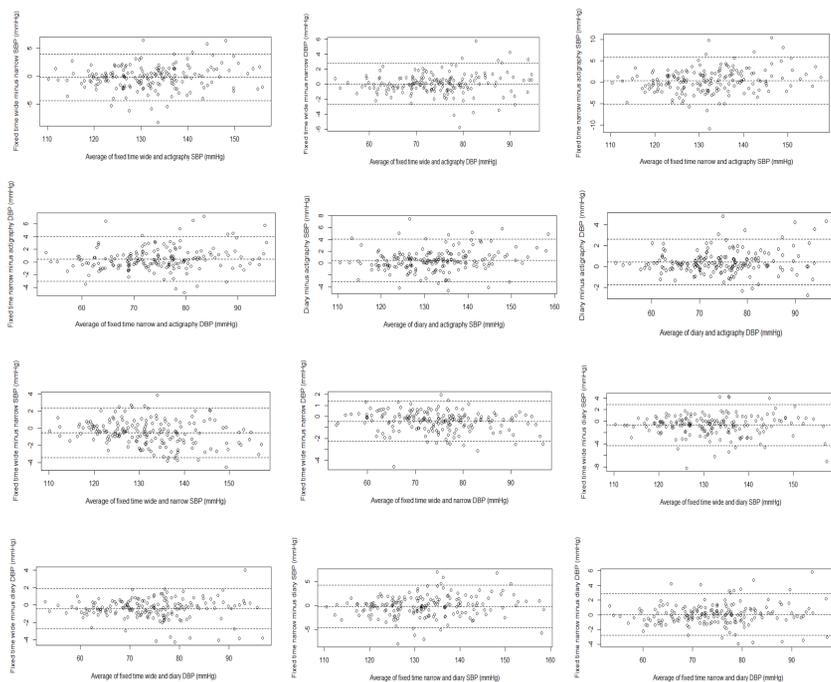


Figure 1. Bland-Altman plots in daytime SBP/DBP

Results

Comparison of BP values:

Mean daytime and nighttime BPs were similar regardless of the definition used (Table 1). Intraindividual daytime BP differences between different definition by Bland-Altman plots were provided in Figure 1.

Agreement to diagnose elevated BPs and dipping status:

- Excellent agreement between different definitions to diagnose elevated BP.
- Good agreement to diagnose non-dipping was detected.

Reproducibility of BP parameters:

ABPM values were most reproducible by diary.

Association between BP and end-organ damage:

- Actual number of end-organ damage subjects: 37 (21.3%)
- BP values obtained using different diurnal definitions did not differ in their association to end-organ damage.

Table 1. Mean BP between different definition of diurnal periods on ABPM.

BP	Fixed time wide	Fixed time narrow	Actigraphy	Diary
Daytime SBP value, mean (SD)	131.66 (9.58)	132.20 (9.97)	131.83 (9.30)	132.37 (9.67)
Daytime DBP value, mean (SD)	74.20 (9.00)	74.64 (9.17)	74.16 (8.84)	74.56 (9.03)
Nighttime SBP value, mean (SD)	123.75 (9.55)	122.66 (9.91)	121.88 (9.74)	122.82 (9.59)
Nighttime DBP value, mean (SD)	68.63 (7.69)	68.08 (7.66)	67.36 (7.49)	67.97 (7.70)

Discussion

Research and clinical implications:

- not support the need for actigraphy
- different definitions of diurnal periods may affect the diagnosis of elevated BP in patients with BP close to diagnostic thresholds.

Strength:

- 1) first Chinese study.
- 2) compared 4 different definitions of diurnal periods.
- 3) explored the association between BP parameters from different diurnal definition and end-organ damage

Main limitations: while sample size was adequate for our primary outcome, it was not adequate for detecting the association between BP and end-organ damage.

Conclusions

- Differing estimations of diurnal definitions provide similar mean BP values and have good agreement for diagnosis of elevated BP and dipping status.
- In individual patients, different definitions of diurnal periods can lead to a 3-5 mmHg difference in patients' BP values and may affect the diagnosis of elevated BP in patients with BP close to diagnostic cut-offs.
- The current study supports using the patient's diary to define diurnal periods.

Reference

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