Diurnal Variations in Blood Pressure: Importance of Ambulatory BP Monitoring

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Normal Pattern of Diurnal Variation

Blood pressure falls during sleep (nocturnal dipping) largely because of sleep and inactivity. It is followed by abrupt increase to the basal value in morning. This morning surge is probably related to sudden increase in sympathetic activity (Figure 1a).

Abnormalities in diurnal variation and their clinical importance

a. Absence of nocturnal dipping (non-dippers) (Figures 1b and 1c)

Inadequate nocturnal dipping may be secondary to disturbed sleep from any cause, lack of sound sleep, obstructive sleep apnea and increased salt intake in dinner in salt sensitive patients.

b. Over dippers (nocturnal fall more than 20mmHg and diastolic BP falling below 75mmHg) (Figure 2a)

It could be secondary to antihypertensive drugs or sedatives.

Non dipping as well as over dipping have been found to be associated with greater cardiovascular damage.1

c. Post prandial over dipping can occur in elderly (Figure 2b) and can be responsible for unexplained syncope.2

d. Abnormal early morning surge (Figure 2c) or abnormal surge on arising from an afternoon sleep.

Abnormal morning surge can be secondary to hostility, morning anxiety, sudden physical activity. It is common in patients with chronic kidney disease. Such post sleep awakening surge are associated with greater cardiovascular damage3 and contribute to increased prevalence of all cardiovascular catastrophes in early morning hours.

References:

1. [Provide references]

2. [Provide references]

3. [Provide references]
e. **White-coat effect (Figure 3a)**

Increase in blood pressure during exposure with the doctor is common but only transient. Usually it lasts less then ten minutes. Persistent white coat effect is not normal and suggests abnormal alerting reaction. If white coat effect results in BP readings above 140/90mmHg in a person whose out of clinic day time readings are below 130/80mmHg, it is labeled White – Coat hypertension. This could result in over diagnosis of “resistant hypertension”. These patients, however, have higher risk of developing hypertension in future and higher risk of cardiovascular damage.

f. **Masked hypertension (Figures 3b and 3c)**

It is mirror image of white coat hypertension. BP is normal in the clinic but is elevated during other times of the day. It can result in false under diagnosis of hypertension. It is associated with greater target organ damage and adverse prognosis.

**References**


