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COMMENT

Is it possible to establish a doctor-patient relationship in the future where type 2 diabetes patients voluntarily measure their blood pressure twice in the early morning?

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"How many times should I measure my blood pressure?" and "Which blood pressure reading is the true blood pressure?" are questions that patients often ask in daily medical practice. How have we, as practicing physicians, answered these questions? Sometimes answers will be based on guidelines, and other times they will be based on intuition gained from experience. However, have patients ever asked me questions like, "Which blood pressure reading is most strongly related to the future new onset of cardiovascular disease?" I have never done so, and this may be because the essential meaning of lowering blood pressure itself has not been conveyed to patients. The mission of practicing physicians is to prevent future cardiovascular events by implementing adequate antihypertensive therapy. In particular, type 2 diabetes patients have a higher risk of developing cardiovascular disease than non-diabetic patients, so treatment strategies aimed at preventing future events are important. To continue this, markers that are easily evaluated and strongly associated with future events are needed in daily clinical practice. Home blood pressure (HBP) can be measured repeatedly and can be practiced in any home. In particular, it has been reported that home morning blood pressure is more strongly associated with cardiovascular events [1]. However, it has not been clarified which HBP measurements were more closely linked to the onset of new cardiovascular events in patients with type 2 diabetes.

To clarify this issue, Sumi et al. [2] conducted the retrospective cohort study to evaluate which HBP measurements in each occasion are more associated with new cardiovascular events in patients with type 2 diabetes. This study evaluated more than 1,000 patients, with blood pressure measurements taken three times in each morning and evening over a two-week period. Furthermore, the median observation period was over seven years, making the analysis from a highly reliable data source. The authors found that the average second morning home systolic blood pressure measurement (MHSBP) was strongly associated with future cardiovascular events in patients with type 2 diabetes (Fig. 1). They also reported that it was strongly associated with cerebrovascular events rather than cardiac events. Patients with type 2 diabetes are at high risk of developing cardiac events, but in this study, no association was found between the occurrence of cardiac events and any of the first, second, or third home blood pressure measurements. As the authors also state, this may be due to the fact that, even when looking at the median values, the subjects' age was relatively young at 65 years, the duration of diabetes was not long at less than 10 years, and HbA1c levels were relatively well controlled at 7.1%. Although a

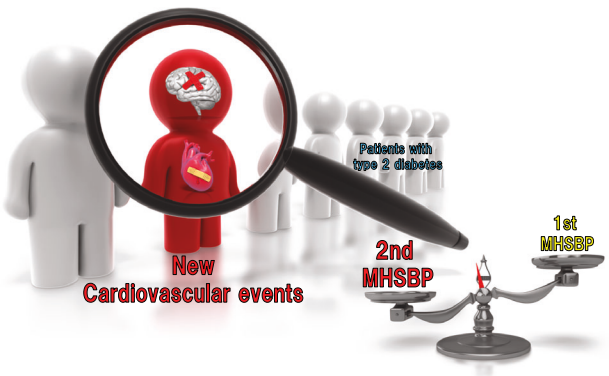

Fig. 1 A second home blood pressure measurement instead of the first per occasion can tell us which type 2 diabetics are at increased risk of cardiovascular events. MHSBP: morning home systolic blood pressure

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sufficient observation period was set, it is possible that the time it took for heart failure or cardiovascular events to develop was not reached because other risk factors in enrolled patients might be controlled. Furthermore, Sumi et al. conducted additional analysis and found that the average second MHSBP during the first 7 days was a stronger predictor of cardiovascular events. In this regard, although the study primarily analyzed home blood pressure measurements taken over a two-week period, it is difficult to get all type 2 diabetes patients to measure their home blood pressure twice a day for two consecutive weeks. Given this, it is extremely useful that the study demonstrated that even a shorter period of seven days is an excellent predictive factor. These results provide clear and actionable indicators for many practicing physicians who treat type 2 diabetes patients, and are an important antihypertensive strategy for preventing cardiovascular events in type 2 diabetes patients.

Here we return to the current guidelines and consider them. In the 2019 Japanese Society of Hypertension (JSH) Guidelines [3], blood pressure should be measured twice on one occasion and the average of the two measurements should be taken. If blood pressure is measured only once, the blood pressure value should be used. If blood pressure is measured three times, the average of the three measurements may also be used. Furthermore, the average values for morning and evening over a seven-day period should be used to assess the effectiveness of treatment. The blood pressure evaluation method used by Sumi et al. [2] is exactly in line with the recommendations in the above-mentioned guidelines, and they clarified the significance of evaluating measurements over a seven-day period. To date, no randomized controlled trial has used the incidence of cardiovascular disease as an outcome, and there is no evidence that directly shows whether antihypertensive therapy based on home blood pressure measurement reduces the incidence of cardiovascular disease compared to antihypertensive therapy based on clinic blood pressure. On the other hand, the HOMED-BP study [4] has reported that home blood pressure during antihypertensive therapy is more strongly associated with the risk of developing and dying from cardiovascular disease compared to clinic blood pressure. A meta-analysis also has been conducted and reported that antihypertensive therapy using home blood pressure is more useful in lowering the average 24-hour ambulatory blood pressure compared to when clinic blood pressure is used [3]. These reports suggest that antihypertensive therapy aiming for blood pressure targets based on home blood pressure may be useful in reducing cerebrovascular disease.

In the author's opinion, it is highly likely that early morning home blood pressure reflects nocturnal hypertension, which is more strongly related to cardiovascular disease, and it is expected that the type 2 diabetes patients in this study are more likely to have increased salt sensitivity due to their pathology, and therefore have a high incidence of nocturnal hypertension. Therefore, as reported by Sumi et al. [2], it is interpreted that the average early morning home blood pressure is strongly related to the onset of cardiovascular disease. In addition, in this study, the first MHSBP was weak in predicting the prognosis of cardiovascular disease, and the second MHSBP was a better predictor, so it is possible that the second measurement of early morning home blood pressure reflects the nocturnal blood pressure of type 2 diabetes patients. Although nighttime blood pressure evaluation is important for preventing events, it is not an easy time for practicing physicians to evaluate the blood pressure. The report by Sumi et al. [2] shows that this limitation can be continuously evaluated by evaluating the second MHSBP, and it is expected that this will be adopted in future diabetes treatment guidelines.

The strength of this study had a large sample size and methods of blood pressure measurements with a home blood pressure monitor with a memory function to collect reliable home blood pressure data. These results, obtained using blood pressure measurements that eliminate selection bias, are considered to be highly reliable and easily reproducible in routine practice. Such results obtained from blood pressure measurements that exclude selection bias are considered to be highly reliable and reproducible in practice. However, even if such evidence is reported, it will not be utilized unless type 2 diabetes patients measure their blood pressure twice in the early morning. In other words, it is important for practicing physicians to continue to provide and evaluate blood pressure measurement guidance. I hope that one day, type 2 diabetes patients will say, "It's better to measure blood pressure twice per occasion. The second blood pressure in the morning affects whether we will develop cardiovascular disease in the future."

Compliance with ethical standards

Conflict of interest The author declares no competing interests.

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