

pain comorbidities) were correlated to have risk factors of cardiovascular diseases, and to be worse self-rated health.

Conclusion(s): For rural Japanese residents, socio-demographic characteristics and lifestyle factors were associated with back and/or knee pain.

Implications: For residents with back and/or knee pain, controlling their weight and doing physical activity more will be important not only for pain management, but also to prevent cardiovascular diseases.

Keywords: Back and knee pain; Physical activity; Socio-demographic characteristics

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Ethics approval: The study was approved by the Ethical Committee of the Graduate School of Medicine, The University of Tokyo, Japan.

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DEEP BREATHING AS PROPHYLAXIS FOR DEEP VEIN THROMBOSIS: FOCUSING ON AIRFLOW VELOCITY

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Background: Deep vein thrombosis (DVT) is a major risk factor for fatal pulmonary thromboembolism. Use of a portable intermittent pneumatic compression device and/or anticoagulant medication is recommended for DVT prophylaxis. However, DVT not only occurs in hospitalized patients, but also healthy people if they are subjected to immobility or situations with limited medical resources, such as in airplanes or disaster areas. Thus, the development of a prophylactic method that does not require machinery is urgently needed. We previously examined the effects of deep breathing (DB) on peak velocity (PV), focusing on breathing rate, and found that PV during DB increased the most at a pace of 3 breaths/min (4.5 times higher than at rest) among three different breathing rates (i.e., 15, 5, and 3 breaths/min). However, the DB was performed at the maximal airflow velocity. Expiration at the maximal airflow velocity involves expiration as rapidly as possible, followed by breath holding before the initiation of inspiration. In this context, breath holding can cause blood pressure to fluctuate widely. In this study, we focused on airflow velocity, adopted a DB method with a constant airflow velocity for achieving DB without breath holding.

Purpose: This study aimed to examine the effects of DB with four airflow velocity patterns on PV in the femoral veins.

Methods: Nine healthy male volunteers (age, 21.8 ± 0.6 years) were enrolled in this study. During rest and inspiration on DB, we measured PV and blood flow volume (FV) of the right superficial femoral vein by pulsed Doppler ultrasound every 2 minutes for a total of three times, and heart rate (HR) with a Holter monitor. DB was defined as breathing in which the subject expired/inspired and reached the maximal expiratory/inspiratory level at a pace of 3 breaths/min. Airflow velocity during expiration or inspiration on DB was either maximal or constant, and the four DB patterns were defined as follows: pattern 1 was maximal–maximal (expiration–inspiration), 2 was maximal–constant, 3 was constant–maximal, and 4 was constant–constant. A metronome was used to control breathing rate. All measurements were obtained with the subject in the sitting position.

Results: PV with each breathing pattern was significantly higher than at rest, and that of pattern 1 was significantly higher than those of patterns 2 and 4 (3.8, 1.9, 3.0, and 1.7 times higher than at rest for patterns 1–4, respectively). FV for pattern 1 was significantly higher than at rest (1.8, 1.5, 1.5, and 1.4 times higher than at rest for patterns 1–4, respectively). For pattern 2, HR at 1 minute after initiating DB was significantly lower than that immediately before initiation and that 6 minutes after initiation. For pattern 4, HR at 1 minute after initiating DB was significantly lower than before initiation (all, $P < 0.05$).

Conclusion(s): DB may be useful for DVT prophylaxis, even without breath holding.

Implications: In situations of immobility and limited medical resources, DB may offer a simple, cost-free DVT prophylaxis method.

Keywords: Deep breathing; Airflow velocity; Deep vein thrombosis

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Ethics approval: This study was approved by the Kitasato University Allied Health Sciences Research Ethics Committee.

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