Strong Point of Inspiratory Muscle Training for Kidney and Immune Functions, and Quality of Life of Chronic Kidney Disease Patients on Hemodialysis

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Study Protocol

This study included patients diagnosed with end-stage CKD who received HD twice a week for more than three months in the Hemodialysis Service. The inclusion criteria were: age 45–54 years, can perform respiratory muscle training (RMT) procedures, have a MIP (Maximal Inspiratory Pressure) value of less than 70% of the predicted measurement results using the micro respiratory pressure meter (RPM) tool, hemoglobin level greater than 8 g/dL, ability to understand oral and written instructions, cooperative and willing to participate in the research, and able to do exercises after signing an informed consent form. The RMT used is Inspiratory muscle training (IMT). The exclusion criteria were: patients with obstructive lung disease, pleural effusion, cardiomegaly, heart failure, coronary heart disease, history of pneumothorax, history of thoracic or abdominal surgery in the last six months, disturbances related to eardrum damage, have received inspiratory and expiratory muscle training in the past six months, and blood pressure >180/110 mmHg or <80/60 mmHg. Subjects are divided into two groups: control and intervention.

We examined the levels of urea, creatinine, and IL-6 (prior to HD) and performed an interview using the KDQOL-SFTM v1.3 questionnaire before the IMT exercise program is conducted. For 12 weeks, the intervention group was assigned an IMT exercise program that included inspiratory muscle strengthening exercises thrice a week at a 50% MIP intensity, five sets per time, ten breathing repetitions per set, for an estimated duration of 20 minutes each using Threshold IMT. The control group received IMT exercise with an intensity of 10% MIP for 12 weeks.

A re-examination of the urea, creatinine, IL-6 levels, and re-administration of the KDQOL HD-SFTM v1.3 questionnaire was performed at the end of the IMT exercise program (after 12 weeks).

Serum urea and creatinine levels were used to measure kidney function. IL-6 levels were used to measure immune function. Inspiratory muscle training included specific exercises to improve ventilation through coordination, endurance, and respiratory strength of the inspiratory muscles. IMT measurements were performed using the Threshold IMT tool. Measurement of MIP was conducted using Micro RPM prior to inspiratory muscle strengthening exercise.

The KDQOL-SFTM v1.3 questionnaire was used to assess quality of life. This questionnaire consists of a physical component summary (PCS), mental component summary (MCS), and kidney disease component summary (KDCS).