**Supplementary Table 1. The characteristics of included trials**

| Studies                  | Regions         | Number of centers | Patients                                      | Comparisons                                                                 | Duration of intervention | Outcome measurements                                                                 | Questionnaire for life quality | Time points of data collection |
|-------------------------|-----------------|-------------------|-----------------------------------------------|------------------------------------------------------------------------------|--------------------------|-------------------------------------------------------------------------------------|--------------------------------|--------------------------------|
| Headley S 2014[1]       | USA             | 1                 | CKD stage 3 with diabetes and/or hypertension | Supervised exercise training at 50%-60% peak oxygen uptake, 3 times per week ($n=25$) | 16 weeks                 | Arterial stiffness; Aerobic capacity; Various blood parameters; Quality of life      | SF-36                           | Baseline 16 weeks later       |
| Van Craenenbroeck AH 2015[2] | Greece         | 1                 | CKD stages 3 to 4 without established cardiovascular disease | 4 daily cycling sessions of 10 minutes each at a target heart rate ($n=19$) | 3 months                 | Peripheral endothelial function; Aerobic capacity; Arterial stiffness Numbers of endothelial and osteogenic progenitor cells; Migratory function of circulatory angiogenic cells; Quality of life | KDQOL-SF                        | Baseline 3 months later       |
| Rahimimoghadam Z 2018[3] | Iran            | 1                 | CKD stages 2 to 3                              | Modified classical Pilates exercises three times a week over a 12-week period ($n=25$) | 12 weeks                 | Quality of life                                                                     | KDQOL-SF                        | Baseline 12 weeks later       |
| Rossi AP 2014[4]        | Portland        | 1                 | CKD stages 3 to 4                              | Renal rehabilitation exercise intervention consisting of usual care plus guided exercise two times per week for 12 weeks ($n=59$) | 12 weeks                 | Physical function; Quality of life                                                  | RAND-36                         | Baseline 12 weeks later       |
| Mustata S 2011[5]       | Canada          | 1                 | CKD stages 3 to 5                              | Exercise and standard care ($n=10$)                                           | 1 year                   | VO2 peak and endurance time; Arterial stiffness; Quality of life                    | SF-36                           | Baseline 12 months later      |
| Aoki DT 2018[6]         | Brazil          | 1                 | Overweight CKD stages 3 to 4                   | The home-based training consisted of walking three times per week on alternate days ($n = 12$); Center-based group used a treadmill, three times per week on alternate days ($n = 13$) | 24 weeks                 | Cardiopulmonary exercise test; Functional capacity tests; Quality of life; Quality of sleep; Clinical parameters | SF-36                           | Baseline 12 weeks later 24 weeks later |
| Tang Q 2016[7]          | China           | 1                 | CKD stages 1 to 3                              | Individualized home-based exercise program ($n=45$)                           | 12 weeks                 | Physical function; Psychological dimensions; Quality of life                        | KDQOL-36                        | Baseline 12 weeks later       |

CKD: chronic kidney disease; SF-36: the 36-Item Short Form Health Survey; KDQOL-SF: the Kidney Disease Quality of Life questionnaire; RAND-36: the RAND 36-item Health Survey; VO2 peak: peak oxygen uptake; KDQOL-36: the Kidney Disease Quality of Life-36 Questionnaire.
| Studies                        | Details of interventions                                                                                                                                                                                                 | Control group                                                                                   |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Headley S 2014 [1]            | Patients were prescribed 16 weeks of aerobic training 3 times per week, but allowed to make up missed sessions within a 2-week period. Most participants started with 15–30 minutes of continuous aerobic exercise using a variety of apparatus and gradually progressed toward a goal of 55 minutes (composed of 5 minutes of warm-up, 45 minutes of conditioning, and 5 minutes of cooldown). Participants worked at 50%–60% of the peak oxygen uptake achieved during the graded exercise test. Heart rate and rate of perceived exertion were monitored. | Follow the instructions of nephrologist or primary care physician without a structured exercise program |
| Van Craenenbroeck AH 2015 [2] | A 3-month home-based intermittent aerobic training program at moderate intensity consisted of 4 daily cycling sessions of 10 minutes each at a target heart rate calculated as 90% of the heart rate achieved at the anaerobic threshold on baseline testing. Magnetically braked home exercise bikes and heart rate transmitters were provided. In the first 2 weeks of the study period, at least 3 training sessions were supervised in the hospital by an experienced medical doctor. For the following 2 weeks, a supervised training session was organized once a week. Adherence was monitored monthly by heart rate data. | Standard therapy without specific instructions about physical activity                         |
| Rahimimoghadam Z 2018 [3]     | A four-hour education session about exercise was provided. The experimental group's participants performed exercises at 11 a.m. every Monday, Wednesday, and Friday at the hospital. In the first session, basic principles of pilates exercises were reviewed, and basic pilates movements (Bridging, Hundred, Roll Up, One Leg Circle [both ways], Roller with closed legs, Single Straight Leg Stretch, Double Leg Stretch, Spine Stretch Forward, Single Leg Kick, Side Kick up and down, Side Kick circles, Rest position [stretch and relaxation], and Curling) were trained and performed. In the first and second sessions, the number of exercises began with 10 repetitions (45 min in total). In the subsequent sessions, stretching exercises (about 5 min), pilates exercises (about 50 min), and cooling down movements (about 5 min) were completed. In sessions 3–12, the number of exercises reached 70–80 repetitions (70 min in total). | CKD routine care                                                                               |
| Rossi AP 2014 [4]             | Participate in guided exercise two times per week for 12 weeks. Exercise sessions consisted of cardiovascular (included treadmill walking and/or stationary cycling), weight training (upper and lower extremity extensions and flexions with free weights), and stretching exercises (started at one set of 10 repetitions of each exercise using 1 to 10 pounds weights and increased to three sets of 15 repetitions). | Usual care                                                                                    |
| Mustata S 2011 [5]            | The training program included supervised and home-based exercise. Supervised training consisted of twice-weekly in-center sessions throughout the study period and included choice of treadmill, stationary cycle, and elliptical trainer. Home training (walking) was initiated in the second month and progressed over 3 months to a frequency of 3 days/week. Exercise duration was increased by 5–10% weekly, and patients used heart rate monitors and ratings of perceived exertion to guide exercise intensity. | Standard care alone                                                                            |
| Aoki KE 2018 [6]              | Home-based group initially underwent three supervised exercise sessions. Each subject in this group received a heart rate monitor and a manual with detailed instructions on how to perform the exercise. The home-based training consisted of walking at locations near the patient’s home, such as a backyard, park or street, three times per week on alternate days. Center-based group used a treadmill, three times per week on alternate days under the supervision. All training sessions were preceded by stretching of the large muscle groups and warm-up (5 min) and ended with cooling down and stretching (5 min) in both exercise groups. The training was performed for 30 min with increments of 10 min in duration every 4 weeks until week eight. | Usual care                                                                                    |
| Tang Q 2016 [7]               | One-to-one exercise education and guidance were provided for 3 times firstly. The home-based aerobic exercise at least 3 times a week involved walking, cycling, and jogging. Individuals were told to initiate the program from a low intensity. | Usual care                                                                                    |
and progressive transition to a moderate level on the basis of their own rating of perceived exertion. Every exercise session consisted of 3 parts: warm-up, exercise, and cool-down. Stretching exercises were the main components of warm-up and cool-down parts that continued for 3–5 min. Formal exercise was delivered for 20–30 min.

a.m.: ante meridiem; CKD: Chronic kidney disease.
### Supplementary Table 3. The quality of included randomized trials

| Study                      | Truly random | Concealed allocation | Baseline features | Eligibility criteria | Blinding assessment | Loss to follow-up | Intention to treat | Study quality scores‡ |
|----------------------------|--------------|----------------------|-------------------|----------------------|--------------------|--------------------|--------------------|-----------------------|
| Headley S 2014[1]          | Yes          | Unclear              | Yes               | Yes                  | No                 | Yes                | Partly Yes†         | 10.5                  |
| Van Craenenbroeck AH 2015[2] | Yes          | Yes                  | Yes               | Yes                  | Yes                | Yes                | Yes                | 14                    |
| Rahimimoghadam Z 2018[3]   | Yes          | Unclear              | Yes               | Yes                  | No                 | Yes                | Yes                | 11                    |
| Rossi AP 2014[4]           | Yes          | Unclear              | Partly Yes†       | Yes                  | No                 | Yes                | No                 | 8.5                   |
| Mustata S 2011[5]          | Yes          | Yes                  | Yes               | Yes                  | Yes                | Yes                | Yes                | 14                    |
| Aoike DT 2018[6]           | Yes          | Unclear              | Yes               | Yes                  | Unclear            | Yes                | Yes                | 12                    |
| Tang Q 2016[7]             | Yes          | Unclear              | Yes               | Yes                  | Unclear            | Yes                | Yes                | 12                    |

* There was at least one item of baseline characteristics being not balanced between the two groups. † Only one patient in the control group who did not receive the allocated intervention was excluded for analysis. ‡ The maximum quality score is 14.
Supplementary Figure 1.

MD: Mean difference; SE: Standardized effect.
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