THE EFFECTIVENESS OF INTRADIALYTIC EXERCISE AEROBIC ON SLEEP QUALITY OF CHRONIC RENAL FAILURE PATIENTS THROUGH HEMODIALYSIS: A SYSTEMATIC LITERATURE REVIEW AND META-ANALYSIS

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Abstract

The chronic renal failure undergoing hemodialysis increases 7% annually causing sleep disorders is more prevalence in adults by 45% to 80%. Aerobic exercise which is non-pharmacological nursing interventions is known as an approach to overcome sleep disorder in chronic renal failure patients. The aim in this study is to review the relevant studies in the effectiveness of intradialytic exercise aerobic to address sleep quality in patients with renal failure undergoing hemodialysis. This research method uses literature searches sourced from ProQuest, PubMed, NCBI, and google scholar with a total of 86 articles and 20 articles that are worth analyzing, the analysis was carried out using Review Manager 5.4. with a 95% confidence level, heterogeneity between studies was assessed using a statistical test with the chi-test, using a random-effects model. The studies in the Asian continent showed that the treatment on patients (2 hours of dialysis with a duration of ≤ 60 minutes) that have characteristics ≥ 3 months undergone HD, resulted high heterogeneity value by chi = 1109494.75. The sleep quality was measured by Pittsburgh Sleep Quality Index (PSQI) instrument. Moreover, the intradialytic exercise evidently improved sleep quality (p-Value <0.06). It can be concluded that intradialytic exercise aerobic has a significant impact in reducing sleep disorders in hemodialysis patients.Therefore, the intradialytic exercise aerobic by standard operational procedures can be refered as a routine intervention for nurses in the hemodialysis room.

Keywords: intradialytic exercise aerobic, sleep quality, chronic renal failure

1. INTRODUCTION

Based on data in Riskesdas, 2013 patients aged > 75 years were in the top rank for the group of patients with chronic kidney failure, which was 0.6% higher than the elderly age group. Meanwhile in the group according to gender, the prevalence of men with chronic kidney failure in Indonesia is 0.3 percent, which is higher than women with chronic kidney failure, which is 0.2% (Forwaty, Malini, Oktarina, 2019). Kidney failure patients who undergo hemodialysis are about 80 percent alive which have an impact on decreasing mortality and morbidity and even experiencing a decrease in quality of life, depression, sleep quality, besides the length of hemodialysis hours is about 12-18 hours a week, this reduces immobilization which affects activity decline and muscle weakness (Wulandari, Imanuel Sri May, 2015).. Based on observations at the Stella Maris Hospital Makassar (March-April 2017

period) of 60 patients with chronic kidney failure undergoing hemodialysis therapy who were detected to have sleep disorders around 50% (Natale et al, 2019). Complaints of sleep disturbances are common and are frequently reported by end-stage renal failure patients undergoing hemodialysis. The prevalence rate of any sleep disorder in chronic renal failure patients ranges from 45% to 80% in adults. Sleep disturbances in chronic kidney failure patients undergoing hemodialysis therapy in addition to causing poor sleep quality, sleep problems also have a negative impact on physical and mental health and can lead to a decrease in the patient's appearance such as cognitive and memory dysfunction, irritability, decreased concentration (Safruddin, 2016).). In addition, other effects of the longterm hemodialysis will result in an increase in parathyroid hormone, renal osteodystrophy, breathing problems during sleep and excessive daytime sleepiness. Chronic kidney disease is a disease that can cause physical problems that cause fatigue that affects daily activities,

causing feelings of worry that can affect sleep quality (Ningrum, Imardiani, Rahma, 2017). There are many types of intradialytic physical exercise that are safe and effective for chronic kidney failure patients who have sleep problems, including the usual intradialytic exercises or those applied, including intradialytic aerobic exercise, intradialytic increased physical activity improving, intradialytic relaxation therapy and intradialytic hypnotherapy (Nurfianti, An, 2019). According to Mitchel et.al, 2015 potential interventions that can be done to improve sleep quality are energy conservation, activity management is intradialytic exercise, Intradialytic exercise is defined as a planned, structured movement carried out to improve physical fitness that is beneficial for maintaining and improving health. Intradialysis exercises carried out at home or in dialysis centers provide benefits for patients undergoing hemodialysis because exercise methods are safe, economical, accessible and can be performed for groups of patients with kidney failure, there are many types of intradialytic physical exercise that are safe and effective for patients. chronic kidney failure undergoing hemodialysis, including intradialysis which is usually done or applied, among others, intradialytic which is useful for improving the quality of sleep of patients with chronic kidney failure undergoing hemodialysis according to several research sources, namely intradialytic aerobic training, intradialytic Increased physical activity improves, intradialytic relaxation therapy, meditation, hypnotherapy (Nurfianti, An, 2019). Regular aerobic exercise will increase physical activity that is well developed can bring many benefits in the process of preventing or rehabilitating disease, strengthening the musculoskeletal, cardiorespiratory system of patients suffering from chronic kidney disease (M. J. de D. Morais et al, 2019).

One method of health therapy that can improve sleep quality is aerobic intradialytic exercise. The exercise given is in the form of aerobic exercise which consists of regular aerobic flexibility or stretching movements in the lower extremities consisting of 5 minutes of warm-up and 10 to 30 minutes of cycling and 20 minutes of cooling down, patients who perform aerobic exercises in a supine position with cycling movements of the lower limbs and with arms supine along hips and at sides and a cooling phase lasting 20 minutes, during which the patient is instructed to remain as relaxed as possible (Zazzeroni et al, 2017), intradialysis is performed during the first two hours of each dialysis session (3 sessions per week). Then the final results in patients with chronic kidney failure who experience complaints of sleep disturbances are measured by polysomnography and PSQI, the results show that exercise improves sleep quality, although not significantly (Clarkson et al, 2019).

Based on studies that examined aerobic intradialysis, good results were obtained with aerobic exercise in hemodialysis patients but with a limited population, hemodialysis patients 50% to 80% of patients who had sleep complaints (in the study only 55%) (MJD Morais et al, 2019). In addition, there are significant changes in the body's nervous, cardiovascular, respiratory, musculoskeletal and endocrine/metabolic systems. Physical exercise leads to an increase in functional capacity, reduces the risk of cardiovascular disease and improves psychological structure, so that the implementation of an aerobic exercise program during hemodialysis is a safe and efficient intervention that helps improve physical performance, nutritional status, improve sleep quality, anabolic response, and muscle strength. MJ de D. Morais et al, 2019). Based on the literature above, researchers are

interested in developing an aerobic exercise intradialytic intervention.

2. METHODOLOGY

Design This research is a systematic literature reviews and meta-analysis or library research with a systematic literature reviews (SLR) design, which is a synthesis of systematic, clear, comprehensive literature studies by identifying, analyzing, evaluating through data collection already exist with an explicit search method and involves a critical review process in the selection of studies (Zed, 2014). The purpose of this method is to help researchers better understand the background of the research that is the subject of the topic being sought and understand why and how the results of the research can be used as a reference for new research. In this study, researchers analyzed and compared several studies related to the effect of intradialytic aerobic exercise on the sleep quality of chronic kidney failure patients undergoing hemodialysis. Problem identification is the process of identifying or inventorying problems. The research problem is something that is important among other processes, because it determines the quality of a research. In this study, researchers will examine the problem through national and international research journals derived from reports on research results. The problem of this research is the research title "effectiveness of intradialytic aerobic exercise on sleep quality of chronic kidney failure patients undergoing hemodialysis". The literature search will be conducted in May – November 2020. The data used in this study is secondary data obtained not from direct observation, but obtained from the results of research that has been carried out by previous researchers. Sources of secondary data obtained in the form of reputable journal articles both nationally and internationally with a predetermined theme.Search data used are sourced from PubMed, NCBI and google schoolar as a larger database carried out using the following combination of keywords. The literature search in this systematic review uses a database that is population: Hemodialysis" OR "Dialysis OR hemodialysis" OR 'CKD OR Chronic Failure OR ESRD OR Chronic Disease OR Chronical or chronically, intervention : 'Intradialytic' OR' Exercise 'OR' sports' Exercise Aerobic 'OR' Exercise Cycling 'OR Intradialityc Aerobic 'OR' Intradialityc Cycling 'OR' Therapy , outcome : "sleep quality 'OR' insomnia 'OR' sleep disorders' OR 'Sleep quality or poor sleep. Quality assessment in the Systematic Literature Review (SLR) method of this study was carried out using the guidelines for critical appraisal skills programmed tools (CASP) Randomized Controlled Trial (RCT) which consisted of 10 questions and obtained results from 77 articles that were worthy of analysis as many as 20 articles. Statistical analysis using Meta-analysis conducted using Review Manager 5.4. Combined probability ratio OR with 95% confidence level. Heterogeneity between studies was assessed using statistical tests with chi-test. If the results of the analysis show that the data is heterogeneous (I2 = 75%) (Review Manager 5.4.), then the determination of the effect size will use a random effect model. To identify the source of heterogeneity, subgroup analysis was performed. Forest plots were used to present the results of the meta-analysis and statistical significance was set at $P < 0.05$. Analysis was used to estimate the effect of the study as a whole. The ethical standards that the author will use to conduct a literature review in this study refer to Wager & Wiffen (2011).

1. Identification problem and keyword

Tabel 1 Analysis PICO

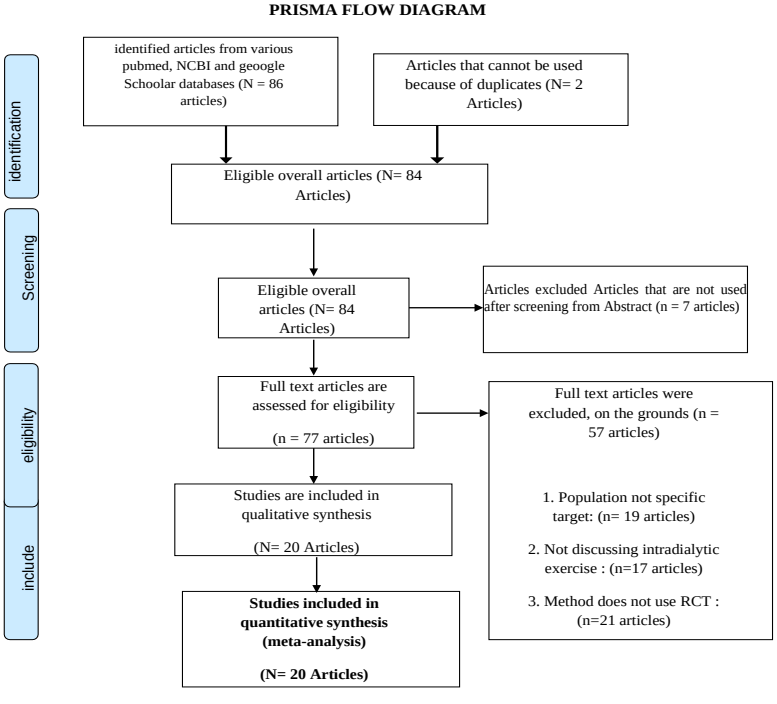
Analysis	Description	Keyword
P (POPULATION**)**	Population in this research is adult patient who had chronic renal failure that have treatment of hemodialisa	"Hemodialysis" OR "*Dialysis* OR *hemodialisafiltration"* OR ' CKD OR *Chronic Failure* OR ESRD OR *Chronic Disease* OR *Chronical or chonically*

ISSN 3064-2698
The Effectiveness Of Intradialytic Exercise

I (INTERVENTION)	Intradialityc exercise Aerobic	'Intradialytic' OR' *Exercise* 'OR' sports' *Exercise Aerobic 'OR' Exercise Cycling* 'OR Intradialityc *Aerobic* 'OR' Intradialityc *Cycling* ' OR' Therapy
C (COMPARASION)	There are no comparasion	
O (OUTCOME)	The Expected outcome of this research is there are effect of intradialytic exercise aerobic to sleeping quality of patient that have chronic renal failure where they going through treatment of hemodialisa	"*sleep quality* 'OR' insomnia 'OR' *sleep disorders'* OR '*Sleep quality or poor sleep*

3. RESULTS

Search for articles using the keywords Hemodialysis" OR "Dialysis OR hemodialysis" OR ' CKD OR Chronic Failure OR ESRD OR Chronic Disease OR Chronical or chronically OR 'Intradialytic' OR' Exercise 'OR' sports' Exercise Aerobic 'OR' Exercise Cycling' OR Intradialityc Aerobic 'OR' Intradialityc Cycling ' OR' Therapy' OR "sleep quality 'OR' insomnia 'OR' sleep disorders' OR 'Sleep quality or poor sleep. In the Pubmed database, there are 60 articles, while in the Google Scholar database, there are 6 articles, and in the NCBI database, there are 20 articles. Overall the number of articles obtained from searching the entire database is 86 articles, there are 2 articles that are duplicates so that they are



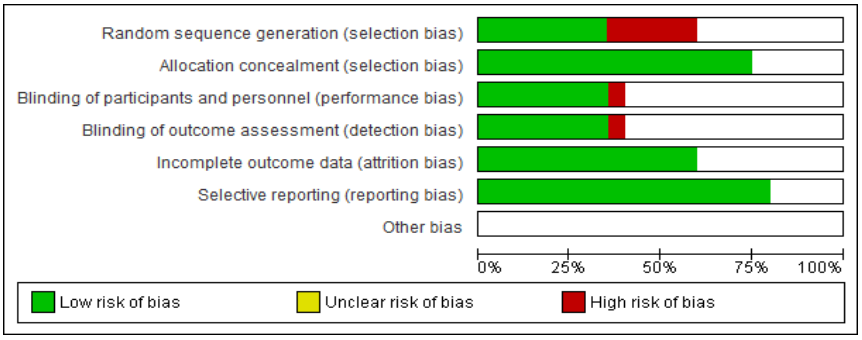
Bagan 1. Prisma Flow Chart

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses

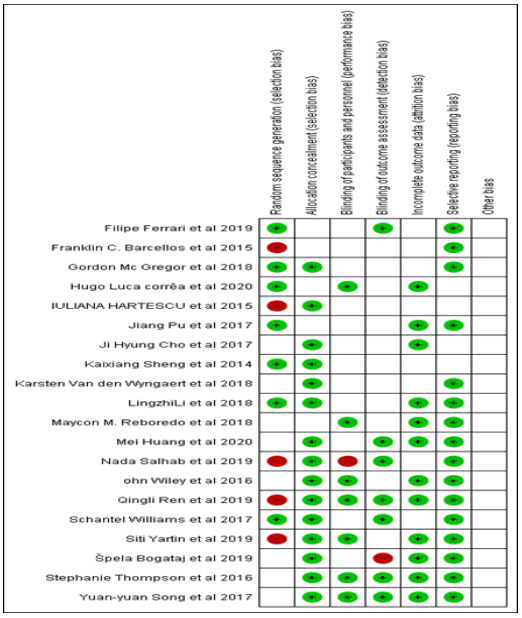
ISSN 3064-2698
The Effectiveness Of Intradialytic Exercise

deleted in the list of articles that will be screened further. From the total articles minus duplication, there were 84 articles that were screened for the first time by filtering, namely from 2014 to 2020, there were 7 articles that were not included on the grounds that the abstract results did not meet the criteria. Then obtained articles with a total of 77 articles for the second stage of screening. The results of the second stage of screening, obtained a total of 77 articles because as many as 57 articles were issued on the grounds that 19 articles had a non-specific population of articles, 17 articles did not discuss intradialytic exercise and 21 articles did not use the RCT method. Next, the article eligibility assessment stage was carried out based on the inclusion criteria, so that the total articles that passed the eligibility screening were 77 articles and 20 articles that were eligible for meta-analysis.

Figure Resiko Bias

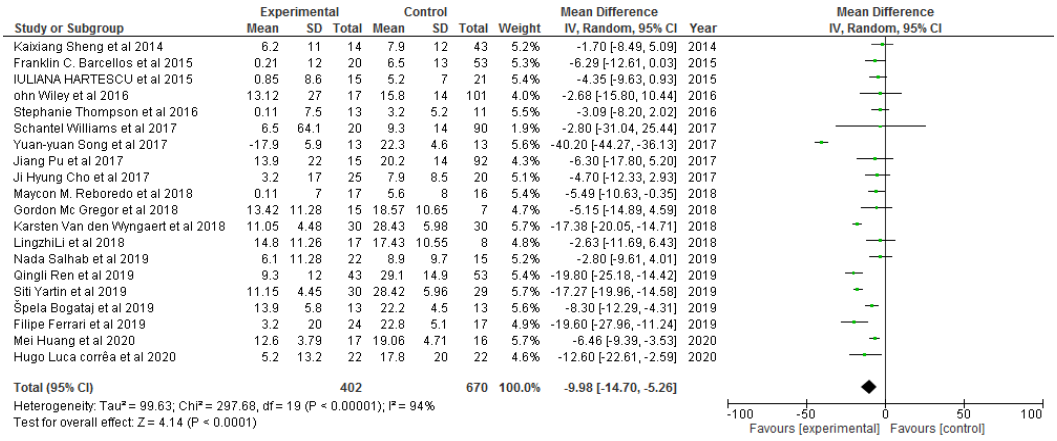


Based on the picture above, the results obtained from 20 included articles, 12.5% reported detailed randomization methods in the low bias category and 25% in the high bias category, 75% explained the allocation in detail in the low bias category, 12.5% explained about the intervention participants. research with low bias category while 12.5% high bias, 12.5% explains the results of research with low bias category and 12.5% high bias, 37.5% explains the imbalance of measurement results from research with low bias category and 75% explains research protocol.



ISSN 3064-2698
The Effectiveness Of Intradialytic Exercise

A potential selection bias in this study because patients who were eligible to participate in this study were not all patients who met the criteria agreed to be respondents and participate in this study, finally, there was a baseline imbalance in the dialysis model between groups. There are 6 studies that have a high risk of bias due to inadequate blinding. The first study (Frankline, 2015) stated that the risk of bias occurs due to non-adherence to the intervention, the second study (Iuliana Hartescu et al, 2015) stated that the risk of bias occurs because there is no adherence to hemodialysis and there is no seriousness in the intervention. The third study (Nada Salhab et al., 2019) there is a bias in the absence of seriousness in the intervention, the fourth study (Qingli Ren et al., 2019) the risk of bias occurs because there is no adherence to hemodialysis, the fifth study (Siti Yartin et al., 2019) the risk of bias occurred because in the middle of the intervention there was a resignation as a respondent and the sixth study (Špela Bogataj et al, 2019) the risk of bias occurred because there was no adherence to hemodialysis and there was no seriousness in the intervention, causing some bias. Meanwhile, 20 studies are categorized as low risk and unclear.



Twenty studies involving 1072 hemodialysis patients consisting of the intervention group and the control group showed the effect of intradialytic aerobic exercise on sleep quality. There was a high heterogeneity of 99.63, chi = 297.68, df = 19, so that the subgroup analysis showed a statistically significant difference between the intervention and control groups of -9.98 [-14.70, -5.26]. Aerobic intradialytic exercise was able to reduce sleep problems in hemodialysis patients (P < 0.0001). There is a strong influence of aerobic intradialytic exercise on sleep quality in hemodialysis patients.

4. CONCLUSION

Based on the results of the analysis of twenty studies on the effectiveness of intradialytic aerobic exercise on the sleep quality of chronic kidney failure patients undergoing hemodialysis: A systematic review and meta-analysis is as follows:

1. The continent of Asia is a continent that has high heterogeneity compared to other continents with a sample category of 50 with a hemodialysis patient category of less than 3 months, it is highly recommended to perform intradialytic exercise interventions without indications with exercise duration 60 minutes and exercise frequency 6 month. Sleep quality was measured using the PSQI (Pittsburgh Sleep Quality Index) before and after the intervention.
2. Exercise gradually every hemodialysis will overcome sleep problems in hemodialysis patients

3. The results of the meta-analysis of intradialytic aerobic exercise have a positive effect and improve sleep quality in hemodialysis patients with a value of chi = 297.68, p = 94% (P < 0.00001). this will have an impact on the patient's ability to cope with sleep problems and a review of these studies can also help in planning research into intradialytic aerobic exercise as a non-pharmacological therapy.

ACKNOWLEDGMENTS

Thank you for opimal and Nagoya university indonesia

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