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QUALITY OF LIFE OF ELDERLY PERFORMING RANGE OF MOTION EXERCISES - A SYSTEMATIC REVIEW

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ABSTRACT

Objective: To systematically evaluate the effects of Range of Motion exercise on the quality of life (QOL) of Elderly. **Methods:** Relevant articles published until December 2022 were retrieved from Technology Journal Database, PubMed, EBSCO, Web of Science, and the Library of Congress. Inclusion criteria were studies in which the subjects were healthy older adults (aged ≥ 60 years), the reported sample size was clear, and the study design was a randomized controlled trial or a research study. In addition, studies were included if they reported the use of at least one QOL questionnaire and investigated at least one form of physical exercise. **Results:** In total, 6 studies met the inclusion criteria, which included 2 studies that used comprehensive physical exercise type as an intervention and 4 studies that used regular physical exercise as an intervention. **Conclusion:** Range of Motion exercise has a positive impact on the QOL of elderly. However, due to the wide and varied scope of the included studies, more randomized controlled trials are needed to examine the effects of different types, intensities, durations, and the frequency of exercise on QOL.

INTRODUCTION

Quality of life (QOL) was first put forward by the US economist J. Calbraith in the 1950s (Wright and Doughty, 1993). Subsequently, the World Health Organization (WHO) defined it as the experience of individuals in different cultures and value systems about their life goals, expectations, standards, and living conditions of the things they care about (The Whoqol Group, 1994). Recently, the growing aging population has called for additional attention to be paid to the QOL of older adults in the society. The QOL of older adults is an important indicator of healthy aging (Fu and Xie, 2010), a comprehensive indicator of good physical and mental states (MS) (Li and He, 2002), and an accurate indicator of overall health status (Zhu et al., 2009). Previous studies have shown that physical exercise is one of the main factors affecting QOL in older adults (Fei and Liu, 2016). However, among the eight meta-analyses conducted on the impact of exercise on QOL, five only analyzed within groups, with no comparisons to the control group, three reported no beneficial effect of physical exercise on QOL (Schmitz et al., 2005; Spronk et al., 2005; Jolly et al., 2006), and two reported positive effects of exercise on QOL (Oldervoll et al., 2004; Van Tol et al., 2006). The remaining three studies compared exercise and control groups, of which one study reported no effect (Lawlor and Hopker, 2001), and the other two reported positive effects of exercise (Schechtman et al., 2001; Netz et al., 2005). These

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discrepancies in findings indicate the need to systematically evaluate existing studies on the basis of controlling the quality of studies and to comprehensively examine the impact of physical exercise on QOL in older adults. This will provide a basis for the subsequent formulation of Range of motion exercise plans to help improve QOL in older adults. Previous studies have investigated QOL in older adults; however, most studies have focused on non-healthy older populations, such as frail older adults (Campbell et al., 2021). Therefore, it is necessary to explore the impact of range of motion exercise on QOL in elderly. The present systematic review included randomized control trials and studies in elderly to summarize the types of Range of motion exercise, physical exercise, exercise frequency, exercise duration, types of study design, and measurement tools.

This study aimed to contribute to this growing area of research by comprehensively and objectively exploring the impact of range of motion exercise on QOL in elderly. In addition, the types of study design may be integrated to improve the value of physical exercise projects, provide a reference for the scientific rigor of future studies, and improve the QOL of older adults.

MATERIAL AND METHODS

The electronic databases searched included (CINAHL, EMBASE, MEDLINE, Scopus, Social Science Citation Index, Web of Science, Google Scholar). The search terms relating to QOL included ‘quality’, ‘of’, ‘life’, ‘elderly’ and ‘range of motion’. These terms were each combined with a further search term relating specifically to Range of motion. These consisted of ‘physical exercise,’ ‘elderly’. Following this, reviewer independently evaluated an assigned subset of articles using previously developed data extraction forms and quality appraisal tools. Each specific item on the quality appraisal tool was openly discussed to reach consensus.

Inclusion Criteria

1. Article reported the quality of life of elderly performing Range of motion exercise.
2. Full Text articles
3. Articles of any design written in English

Exclusion Criteria

1. Articles not reporting the quality of life of elderly performing Range of motion exercise.
2. Non peer reviewed articles

Quality Assessment

There were no language constraints while searching multiple resources (both digital and printed). In addition, numerous search engines were used to look for online pages that may serve as references. Inclusion and exclusion criteria were documented. Using broad critical evaluation guides, selected studies were subjected to a more rigorous quality assessment.

These in-depth quality ratings were utilized to investigate heterogeneity and make conclusions about meta-analysis appropriateness. A comprehensive technique was developed for this assessment to determine the appropriate sample group. The criteria for evaluating the literature were developed with P.I.C.O. in mind.

(Cronin et al., 2008)suggest that in order for nurses to achieve best practice, they must be able to implement the findings of a study which can only be achieved if they are able to read and critique that study.(J, 2010) provides a definition of a systematic review as a type of literature review which summarizes the literature in relation to a single question. It should be based on high quality data that is rigorously and explicitly designed in order for the reader to be able to question the findings.

This is supported by (Cumpston et al., 2019) which proposes that a systematic review should answer a specific research question by identifying, appraising and synthesizing all the evidence which meets a specific eligibility criterion(Pippa Hemingway, 2009) suggest a high - quality systematic review should identify all evidence, both published and unpublished. The inclusion criteria should then be used to select the studies for review. These selected studies should then be assessed for quality. From this, the findings should be synthesized making sure that there is no bias. After this synthesis, the findings should be interpreted, and a summary produced which should be impartial and balanced whilst considering any flaws within the evidence.

Data Collection Strategies

(Chapter 5: Collecting Data | Cochrane Training, n.d.)highlight that data collection is a key step in systematic reviews as this data then forms the basis of conclusions which are to be made. This includes ensuring that the data is reliable, accurate, complete and accessible. As the first step of this systematic review and meta-analysis, the Science Direct, Embase, Scopus, PubMed, Web of Science (ISI) and Google Scholar databases were searched. To identify the articles, the search terms of Quality of Life included ‘range of motion’, ‘exercise’, ‘elderly’, ‘physical exercise’ and all the possible combinations of these keywords were used.

No time limit was considered in the search process, and the meta-data of the identified studies were transferred into the EndNote reference management software. In order to maximize the comprehensiveness of the search, the lists of references used within all the collected articles were manually reviewed.

Keywords used as per MeSH: Quality of Life included ‘exercise’, ‘Range of Motion’, ‘Physical exercise’, ‘elderly’ and ‘old aged’

Inclusion/exclusion criteria.

For this review, a clear strategy was produced in order to identify the relevant inclusion and exclusion criteria (see table below). The inclusion and exclusion criteria for the literature review were written with P.I.Co. in mind. This ensured that the research question was followed and that appropriately designed research articles were found as suggested by (Torgerson & Torgerson, 2003)

As this review focuses on the Quality of life of elderly performing Range of motion exercise were deemed appropriate (Pati & Lorusso, 2017) highlight that the inclusion and exclusion criteria within a literature search is a source of potential bias therefore higher trust and credibility can be gained by the clear documentation of such exclusion and inclusion criteria. Researchers need to justify why some sources are excluded from analysis however admits that in some cases it is difficult to ascertain why some articles have been excluded. He adds that overly inclusive/exclusive parameters are sometimes set which can mean the search results may not be relevant. The inclusion criteria set by PICo

Population/Problem	Elderly
Interest	Elderly performing Range of Motion Exercise
Context	Globally

Inclusion Criteria	**Exclusion Criteria**
Elderly Individual above 50 Years	Elderly Individual below 50 Years
Articles written in English	Articles published more than 10 years ago
Studies that examined the Quality of life of elderly performing Range of motion exercise	Studies without sufficient data
Studies that were original	Duplicate sources
Studies that their full text was available	Case reports

In order to limit the search results to a manageable level, I excluded studies which were more than 10 years old. (Lipscomb, n.d.) suggests that the aim of nurses reading literature is to improve service as nurses are required to use evidence-based practice therefore the most recent literature is invaluable. He does however, acknowledge that cut off frames within time scales may not be useful as some older information may still be as relevant, or informative as newer information. I excluded articles which were not written in English as language bias could be prevalent due to the authors' limited understanding and with the risk of the translation being incorrect. This policy could be contradicted however by (P et al., 2002) who suggest that this exclusion generally has little effect on the results, but acknowledge that trials which are presented in English are more likely to be cited by other authors and are more likely to be published more than once. I started with basic search of key words using Boolean operators and then filtered these by adding different filters from my inclusion criteria. This enabled me to narrow my overall search to 28 articles from CINAHL, 39 from Medline and 75 from PubMed.
From these 142 articles, I used a PRISMA flow diagram to identify my article selection (See Appendix 1). Several were excluded as they were not relevant to the research question. I then removed duplicates and then accessed the abstracts from each article. I also excluded articles which did not covered meta-analysis and this left a total of six articles which met the criteria for this systematic review and were therefore included.
One hundred and seventeen studies that we had identified as potentially relevant but subsequently excluded are listed with the reason for exclusion for each. The most common reasons for exclusion were: study design (not a systemic Review); multicomponent studies with insufficient detail on Quality of life of elderly performing Range of motion exercise.

RESULTS

The final articles will be critiqued and analysis. The six studies included in the analysis were all qualitative studies ranging from three months to Two year. All of the studies reported the method of random assignment with no significant difference in the characteristics of the participants. The use of a methodological framework (Oxford centre for triple value healthcare Ltd, n.d.) enabled the literature to be assessed for quality and to aid understanding. The table below is used to display an overview of each article.

Author/s Year	Sample Size	Study Design	Main findings
Li et al., 2016	482	Survey	The total rate of depression among 482 elders was 54. 36%, among which 46. 06% （ 222 /482）,7. 88%（ 38 /482） and 0. 41%（ 2 /482） were mild, moderate and severe depression, respective ely. The result of multivariate analysis showed that the main influencing factors for depression were duration for every physical activity（β=-2. 167）, monthly income （ β =- 2. 661）, times for physical activity every week （ β =- 2. 826）, educational level （ β = 1. 694 ）, occupation（ β =- 3. 337） and exercise intensity （ β =- 1. 112 ）. The main influencing factors for the quality of life were duration for every physical activity （ β = 4. 302）, times for physical activity every week（ β = 3. 036）, monthly income （ β = 2. 114）, educational level（ β =- 2. 160）, occupation （ β = 4. 324） and gender （ β = 2. 356 ）. There was a negative correlation between the depression score and the total score and scores of different fields of the quality of life in elders from urban community （ all P ＜ 0. 05). Conclusions Regular physical exercise was an important factor to improve the depression and life of quality among aged people.
Sang-Ho Oh et al 2017	1,586	Cross Sectional study	The EQ-VAS scores of the exercisers was significantly higher than those of the non-exercisers for all exercise types. Subjects with problems in mobility dimension performed less exercise of all types of than those with normal mobility (resistance: OR, 0.687; flexibility: OR, 0.733, and walking: OR, 0.489). The self-care dimension was independently correlated with flexibility (OR, 0.558) and walking (OR, 0.485).

Luke S Acree 2006	112	Survey	The HRQL scores in all eight domains were significantly higher ($p < 0.05$) in the group reporting higher physical activity. Additionally, the more active group had fewer females (44% vs. 72%, $p = 0.033$), and lower prevalence of hypertension (39% vs. 60%, $p = 0.041$) than the low active group. After adjusting for gender and hypertension, the more active group had higher values in the following five HRQL domains: physical function (82 ± 20 vs. 68 ± 21, $p = 0.029$), role-physical (83 ± 34 vs. 61 ± 36, $p = 0.022$), bodily pain (83 ± 22 vs. 66 ± 23, $p = 0.001$), vitality (74 ± 15 vs. 59 ± 16, $p = 0.001$), and social functioning (92 ± 18 vs. 83 ± 19, $p = 0.040$). General health, role-emotional, and mental health were not significantly different ($p > 0.05$) between the two groups.
Carlos Soares Pernambuco 2012	159	Survey	The sample consisted of 159 physically independent and apparently healthy individuals of either sex, with mean age of 66.61 ± 4.73 years. Active group obtained mean 14.32 ± 0.763 in whoqol's scores for levels of quality of life, the Control group (CG) obtained mean 13.31 ± 0.94 and p-value 0.05. The ANOVA with repeated samples showed higher values for active group when compared with control group after intervention, the significant level was $p < 0.05$. It must be recognized that not every aspect of human life is reduced to the practice of physical activity; however, it is an important instrument that generates well-being in this age group.
Diane L. Gill 2013	142	Survey	Findings suggest that PA contributes to multiple aspects of QoL, that social and emotional benefits are primary motivators and outcomes for participants, and that the meaning of QoL and PA benefits is subjective and contextualized, varying across individuals and settings. Programs that directly target and highlight the multiple dimensions and integrative QoL, while

			considering the individual participants and contexts, may enhance both PA motivation and participants' health and QoL.
Vasiliu Ana-Maria 2015	120	Randomized controlled trial	The participants involved in the exercise-training program had a moderate QoL improvement, compared to those involved in cultural activities, who experienced no change or even a worsening of their QoL. However, the between-groups differences did not attain the statistically significant threshold, when globally assessed, F[1, 103] = 2.98, p = .087, nor when the analysis was restricted to the physical (F[1, 103] = 2.78, p = .099) or mental components (F[1, 103] = 3.83, p = .053).

DISCUSSION

The literature included in this study showed a steady increase in the number of publications with time, which indicated that the QOL of older adults continues to be of significant interest to scientists (Man et al., 2017). Most studies were investigative studies. In terms of the frequency and duration of exercise, our results showed that exercising for at least 30 min two times per week improves the QOL of Chinese healthy older adults. In terms of measurement tools, numerous scales were used to assess the QOL of healthy older adults in China, of which the SF36 was the most widely used. The WHOQOL-OLD has not yet been used; it has only been applied to a non-healthy older adult population in China. Methodological quality evaluation revealed that all included articles were of medium or good quality although several shortcomings remain: (1) some studies did not provide details or specific explanations of the inclusion criteria for subjects; (2) most studies failed to provide baseline values for intervention and control groups, which made it impossible to determine whether baseline levels were similar across groups; (3) most studies did not report blinding of subjects, therapists, and assessors; (4) none of the studies provided point estimates or measures of variability for key outcomes; and (5) the measurement indicators used in some studies were unclear (e.g., exercise frequency, exercise duration, and main research results).

Therefore, we encourage future studies to report relevant research information in as much detail as possible, implement blinding, ensure scientific rigor, control bias, and improve the overall quality of the research methodology. We found that physical exercise has varying degrees of positive effects on the QOL of older adults in China. Regardless of the type of exercise, as long as individuals engaged in some form of exercise, the QOL of older adults could be improved. Previous meta-analyses have reported that exercise improves the cognition, emotion, and sleep quality of older adults (Wu et al., 2015; Kazeminia et al., 2020; Ye et al., 2020), which is conducive to the improvement of the QOL of older adults.

The effect of physical exercise on the QOL of healthy Chinese older adults was mainly reflected in MH and physical health. Different types of exercise had varying effects on the MH and physical health of older adults. For example, in the case of comprehensive physical exercise

types, body–mind exercise had a positive impact on the MH and physical health of older adults. When the older adults practiced Liuzijue, Baduanjin, 24-form Tai Chi, and Chen-style Tai Chi, they paid attention to "mind calmness and concentration," eliminated distracting thoughts, focused their minds, and trained their brains. In addition, the abdominal breathing method also helped with mood regulation and stress reduction. During exercise, every part of the body needs to coordinate to fully mobilize all the senses. Exercise allows older adults to give some direction to their attention; it also cultivates the coordination of the brain and promotes better attention processes. In addition, long-term exercise has a mild effect on the immune function of older adults (Shen et al., 2013), whereas Xiyangcao has been shown to have a positive effect on physical health. In terms of regular physical exercise types, doing exercises in the morning was shown to have a positive effect on the mental state, psychology, and cardiopulmonary function of older adults and effectively improve their physical health and MH of older adults (Zhang et al., 2016). Furthermore, doing exercise conducted at least three times per week had a beneficial effect not only on disease prevention and control, but also on MH. Therefore, we suggest that future studies should focus on specific psychological or physiological aspects of one or more exercise types, and explore the relationship between physical exercise and QOL in older adults.

Different study designs had an impact on the effect of exercise on the QOL of older adults . In the investigative studies, irrespective of the type of exercise, the exercise group exhibited a positive effect on QOL. In the experimental studies, most studies used an active control group (i.e., a different form of exercise than the intervention group, such as less exercise or another form of exercise), and results were consistent with those of the studies that used a blank control group. Importantly, both designs showed that exercise was effective. Either type of control group may be used, to compare with the intervention group to explore the effect of physical exercise on QOL in older adults. To better explain the results, we suggest including two control groups in the future; namely, a non-exercise group and a group which exercise not used in the intervention. Moreover, to improve the values of the studies, we suggest conducting studies on multiple forms of exercise, regardless of whether the study used an investigative or experimental design. In addition, because of the small number of experimental studies, we encourage additional experimental studies to clarify the specific impact of physical exercise on QOL.

CONCLUSION

Our systematic review showed that physical exercise has a positive effect on the QOL of healthy older adults. Body–mind exercises are effective in improving the physical health and MH of older adults, whereas Xiyangcao only had a positive effect on physical health. However, given that the methodological quality of the literature was generally low, we recommend that relevant training is provided to researchers to improve the quality of research. Future studies should report relevant study information in as much detail as possible and use consistent research methods to obtain more reliable results.

DATA AVAILABILITY STATEMENT The original contributions presented in the study are included in the article.

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