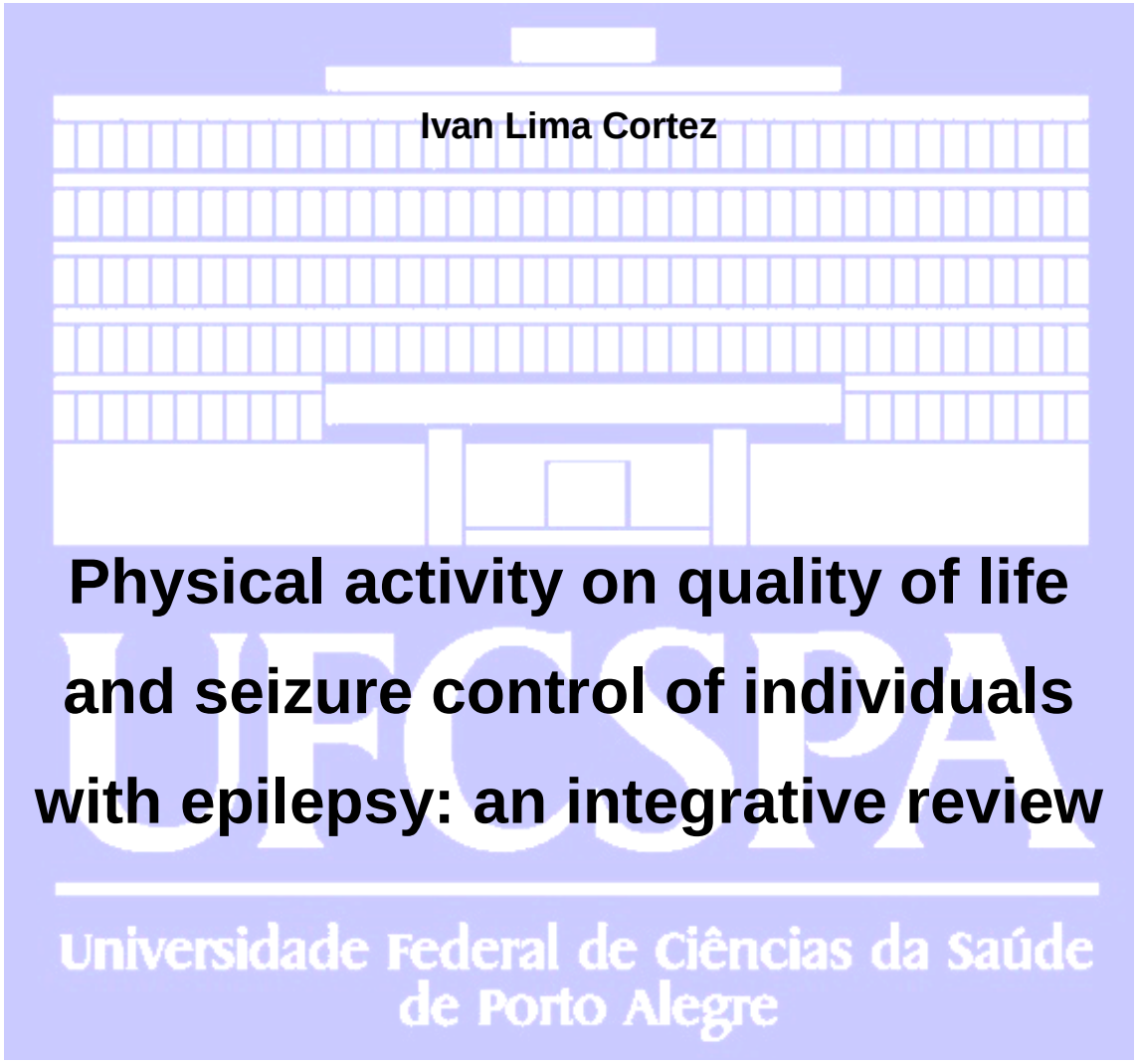
UNIVERSIDADE FEDERAL DE CIÊNCIAS DA SAÚDE DE PORTO ALEGRE

CURSO DE FISIOTERAPIA



Ivan Lima Cortez

Physical activity on quality of life and seizure control of individuals with epilepsy: an integrative review

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Ivan Lima Cortez

Physical activity on quality of life and seizure control of individuals with epilepsy: an integrative review

Trabalho de Conclusão de Curso de Fisioterapia, da Universidade Federal de Ciências da Saúde de Porto Alegre, como requisito parcial para obtenção do título de Bacharel em Fisioterapia

Orientador: Aline de Sousa Pagnussat

Coorientador: Ritchele Redivo Marchese

Porto Alegre

2022

Aos meus pais, Zilmar e Miriam, ao meu companheiro de vida, Jacó Schneider e à minha enteada Kamila Schneider, pelo apoio incondicional na concretização desta importante fase de minha vida.

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RESUMO

Objetivos: Investigar a qualidade de vida e a ocorrência de crises em pessoas com epilepsia que estão envolvidas em algum tipo de atividade física. **Metodologia:** Foi desenvolvida uma revisão integrativa a partir de uma busca sistemática em bases de dados (sem restrição de ano de início de publicação até Julho de 2022: MEDLINE (via PubMed), Cochrane Central Register of Controlled Trials (Cochrane CENTRAL), Physiotherapy Evidence Database (PEDro) and EMBASE. **Resultados:** os estudos apontam o impacto que a atividade física tem sobre a qualidade de vida e o controle de crises em pessoas com epilepsia. Além disso, os estudos abordam a saúde geral dos participantes pré e pós-intervenção. **Conclusão:** para esta população em específico, atividade física mostrou-se benéfica, porém é recomendado escolher com cautela as modalidades a ser executadas por esta população.

Palavras-chave: Fisioterapia. Epilepsia. Qualidade de Vida.

ABSTRACT

Objectives: To investigate the quality of life and seizure occurrence in people with epilepsy that are engaged in some type of physical activity. **Methodology:** An integrative review was conducted. Electronic search was conducted on databases (from the inception to July 2022): MEDLINE (via PubMed), Cochrane Central Register of Controlled Trials (Cochrane CENTRAL), Physiotherapy Evidence Database (PEDro) and EMBASE. **Results:** the studies show the impact that physical activity has on quality of life and on seizure control of people with epilepsy. Furthermore, the studies approach the overall health of the participants pre and post interventions. **Conclusion:** for this specific population, physical activity has been proven to be beneficial, but it is recommended to carefully choose the modalities to be performed for this population.

Key words: Physical Therapy. Epilepsy. Quality of Life.

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LISTA DE ABREVIATURAS E SIGLAS

PWE: people with epilepsy;
QoL: quality of life;
ILAE: international league against epilepsy;
CT: controlled trial;
YR: year;
M: male;
F: female;
MTH: month;
MIN: minute;
WK: week;
AED: antiepileptic drug;
NR: not reported;
VO^2max: peak oxygen intake;
EG: experimental group;
CG: control group;
RCT: randomized controlled trial.

SUMÁRIO

ARTIGO

Physical activity on quality of life and seizure control of individuals with epilepsy: an integrative review

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Ivan Lima Cortez [1,2], Vinícius Horn Vieira Mabilia[1,2], Ritchele Redivo Marchese[2,3], Maira Jaqueline da Cunha[2,3], Aline de Souza Pagnussat [1,2,3 *]

[1]Department of Physiotherapy, Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSPA), Brazil.

[2]Movement Analysis and Rehabilitation Laboratory, Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSPA), Brazil.

[3]Rehabilitation Sciences Graduate Program, Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSPA), Brazil.

Correspondent Author:

Aline de Souza Pagnussat, PhD
Rehabilitation Sciences Graduate Program
Universidade Federal de Ciências da Saúde de Porto Alegre – UFCSPA
245 Sarmento Leite Street - Porto Alegre, RS, Brazil - Zip code: 90050-170
Phone: + 55-51-3303 8833
Email: alinespagnussat@gmail.com

Introduction

Epilepsy is among the most common neurological conditions. It is a public health issue and affects 65 million people worldwide (1). Epilepsy is characterized by spontaneous recurrent seizures that involve hyperexcitable neurons. It is caused by focal or generalized changes in neurological functions triggered by abnormal electrical activity in the cortex (2, 3). In addition to recurrent seizures, people with epilepsy (PWEs) have psychological and neurological comorbidities such as depression, anxiety, headaches, and cognitive impairment (4). These comorbidities negatively affect epilepsy patients' health-related quality of life (QoL) (5). However, despite these comorbidities, limited advancement has been made to potential therapies focused on these specific complications in PWE.

Pharmacological treatment is crucial for PWEs, and despite advances in pharmacotherapy, at least a share of PWEs continue to experience seizures with the currently available therapies (6, 7). Furthermore, antiepileptic drugs from first and second generations may cause common side effects such as hypotension, muscle weakness, anemia, weight gain, loss of coordination, dizziness, trouble sleeping, constipation, and behavioral problems (8). These side effects negatively affect the general health and QoL of PWEs (5). Thus, there is increasing interest in potential therapies targeting to improve the outlook of epilepsy and its impact on seizures (9).

Physical activity improves cardiorespiratory fitness and lowers the risk of all-cause mortality (cardiovascular disease, obesity, and diabetes mellitus). Also, physical activity can improve cognition and reduce anxiety and depression in the general population (10-13). Animal and human studies suggest that exercise is beneficial for seizure control, decreases the side effects associated with medication, and improves overall well-being (14, 15).

There are concerns about the participation of PWEs in sports as a risk factor for inducing seizures, harming the individual, or having a negative health impact (16). However, the "International League Against Epilepsy" (ILAE), an important committee on epilepsy, recommends the sportive practice addressed

for PWEs (17), suggesting that there is no evidence that physical activity causes negative health impact PWEs (17).

Although physical activity is recommended for PWEs, it is necessary to know their effects on this population. This integrative review aims to address this question. We performed an integrative review of clinical to verify if physical exercise could influence seizure frequency in PWEs. Secondary, we investigated the effect of physical therapy on QoL.

Methods

Literature Search

A systematic search of scientific literature was conducted until July 2022. The scientific databases MEDLINE (via PubMed), Cochrane Central Register of Controlled Trials (Cochrane CENTRAL), Physiotherapy Evidence Database (PEDro) and EMBASE were searched. We included studies written in English and Portuguese. Filters of year of publication were not applied. The following terms were used: “(“Epilepsy”[Mesh] OR “Epilepsies” OR “Seizure Disorder” OR “Seizure Disorders” OR “Awakening Epilepsy” OR “Epilepsy, Awakening” OR “Epilepsy, Cryptogenic” OR “Cryptogenic Epilepsies” OR “Cryptogenic Epilepsy” OR “Epilepsies, Cryptogenic” OR “Aura” OR “Auras”)” , "Occupational Therapy"[MeSH] OR "Physical Therapy Modalities"[MeSH] OR "Rehabilitation"[MeSH] OR "Exercise Therapy"[Mesh] OR "Exercise Movement Techniques"[Mesh] OR "Physical Therapy (Specialty)"[MeSH] OR "rehabilitation"[SH] OR rehabilitati*[tiab] OR physiotherap*[tiab] OR (physical [tiab] AND (therapy[tiab] OR therapies[tiab] OR activity[tiab] OR activities[tiab])) OR exercis*[tiab] OR training[tiab] OR (occupational[tiab] AND (therapy[tiab] OR therapies[tiab])) [MeSH] and “randomized controlled trial [pt] OR controlled clinical trial [pt] OR randomized controlled trials [mh] OR random allocation [mh] OR double-blind method [mh] OR single-blind method [mh] OR clinical trial [pt] OR clinical trials [mh] OR ("clinical trial" [tw]) OR ((singl* [tw] OR doubl* [tw] OR trebl* [tw] OR tripl* [tw]) AND (mask* [tw] OR blind* [tw])) OR (placebos [mh] OR placebo* [tw] OR random* [tw] OR research design [mh:noexp] OR comparative study [mh] OR evaluation studies [mh] OR follow-up studies [mh]

OR prospective studies [mh] OR control* [tw] OR prospectiv* [tw] OR volunteer* [tw]) NOT (animals [mh] NOT humans [mh]) ” [MeSH]. We did not include words related to the outcomes of interest to enhance the sensitivity of the search. The search strategy was adjusted for each database.

Study Selection

Two independent authors (IC and VM) screened papers about the topic epilepsy on the specified scientific databases. Initially, were evaluated titles and abstracts. Duplicated articles were identified and eliminated. The following step was to assess the entire paper, checking out if the article fulfilled the established inclusion criteria. In case of disagreement, it was resolved by consensus or by a third reviewer.

Assessment of Characteristics of Trials

Inclusion criteria

For this integrative review, the papers must present type of physical activity practiced by the group of participants besides that, they also must have documented both the pre- and the post-intervention evaluation and the timeline for follow-up of both groups.

Participants

Characteristics of participants such as age range, gender, type of the disease, frequency of seizures and average disease duration are presented on table 1.

Design of Trials

For this integrative review were chosen (a) controlled trials, randomized or not, (b) with outcomes related to quality of life and/or seizure control of individuals with epilepsy and (c) with timeline for the follow-up.

Interventions

The included studies must present clear details about the interventions always related to physical activity. Interventions related to other procedures, such as surgery, behavioral treatment or pharmacological treatment were excluded.

Outcomes

The primary outcome was the influence of physical exercise on seizure frequency of PWEs. The secondary outcome was the effect of physical therapy on QoL of PWEs.

Results

Initially, we identified 7416 articles in these four scientific databases: PubMed, Cochrane, PEDro and Embase. After the removal of duplicated articles, 7064 papers were screened by titles and abstracts. The refined search on preselected databases identified 118 articles for full reading, considering methodology, type of study, pre- and post-intervention, and timeline. Both researchers agreed that eleven papers met the criteria for this integrative review. Figure 1 shows the flow diagram of the study. Due to a reduced number of articles retrieved, a meta-analysis would not be possible. Table 1 depicts all information about included articles, measurement tools and characteristics of participants.

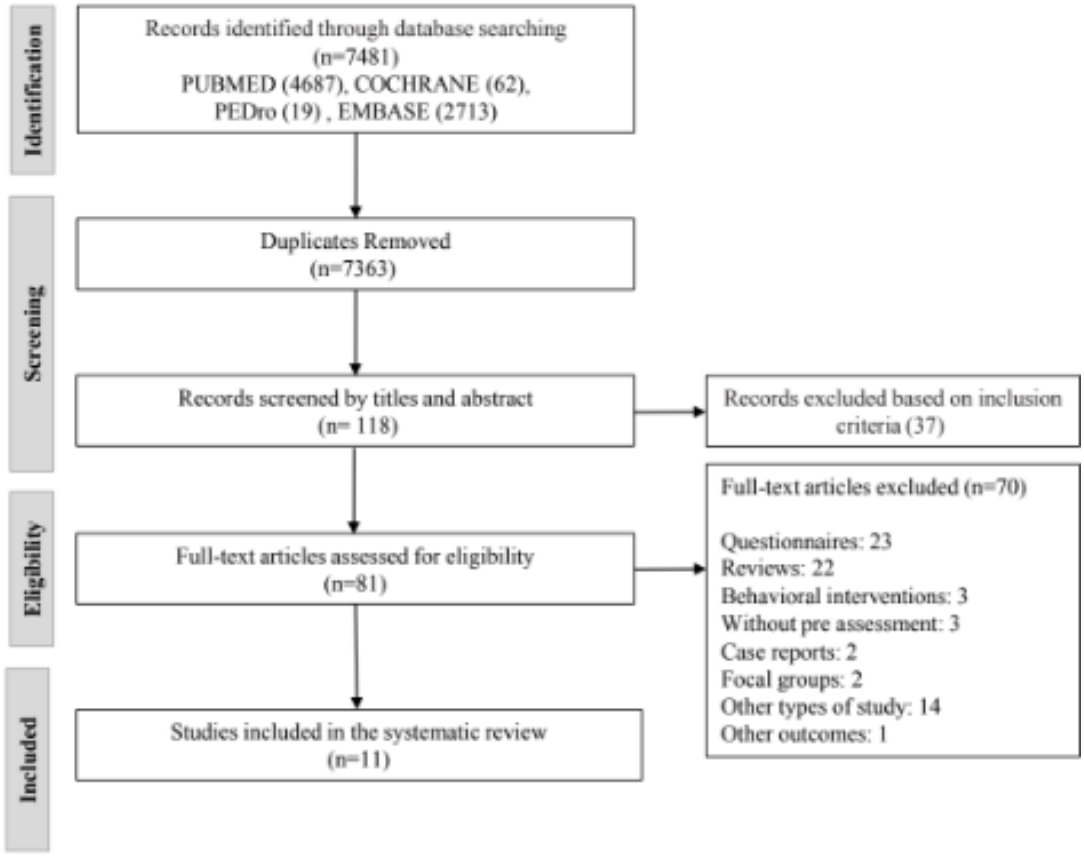

Figure 1. Flow diagram.

Participants

A total of 349 participants were included in the review. The age of participants for the included studies ranged from 6 to 60 years. The studies approached different types of epilepsy: generalized (secondarily, tonic, and tonic-clonic) (18-23), partial (with secondarily generalization, simple and complex) (18-24), absence (21, 25), benign (with centrotemporal spikes or not) (26, 27), refractory (28), and myoclonic epilepsy (22). The seizure frequency of the participants was numerically categorized in seizures in the previous weeks/months/years (20, 22, 23, 26, 27), seizures per month in previous years (28, 29) or median daily/weekly/monthly seizure frequency (19, 24, 25). One of the selected articles did not bring the information about seizure frequency of the participants (21). The onset of the symptoms of epilepsy varied from one year prior to the study until 22 years previously to the current study. Five articles did not report this information (22, 23, 25-27).

Interventions

Two studies prescribed a set of physical activities focusing on a variety of exercises along four and fifteen weeks, respectively (18, 19). One of the studies (25) made one session with a standard protocol of physical activities for all the participants. Two studies (20, 24) applied a practice of Yoga or some exercises mimicking it. One of the studies (21) stablished a program of Kempo Karate classes along ten weeks. Another study (23) enrolled the experimental group in a program of cardiovascular, flexibility and strength training lasting twelve weeks.

Two studies established different sets of physical activities for the participants including outdoors games, dancing, and gym exercises (26, 27). One of the studies (22) separated the participants in two groups, one group of Yoga practice and the other group engaged in a behavioral treatment. Both groups took part in the sessions for twelve months. Another study (28) divided

the participants in two groups, one group of Yoga practice and other engaged in quiet sitting and gym exercise. All the participants were evaluated in the tenth week.

Outcomes

The influence of physical exercise on seizure frequency of PWEs

One of the studies shows no report of seizures during the physical activity (18). A similar result was found on the study of Esquivel et al (25), participants in the physical activity phase had a lower average frequency of absences compared to the period previous to the beginning of the exercises. Another study (19) reported specifically when the frequency of seizure happened during the exercise protocol, it occurred during the dancing period or in the cool down period. A ten-weeks Kempo Karate study (21) found no difference in seizure frequency and a minimum adjustment on antiepileptic drugs, during the intervention period, was necessary.

One of the studies (22) reported that the participants have decreased their seizure frequency by the time of the follow-up and 50% of the Yoga group reached seizure-free status. A pilot study (24) utilizing Yoga as a investigation method reported 50% of seizure frequency reduction in the three months after the last session protocol. Another study (23) reported participants with seizure-free status. Ten participants of the exercise group were seizure-free at the beginning of the trial and did not change their status. There was no report of seizure related to physical activity in that study.

The effect of physical therapy on QoL of PWEs

The studies gathered in this review considered the importance of health-related quality of life for PWEs and the impact of their neurological condition on social, academic, physical, and psychological aspects. One of the studies (21) reported that the participants had some improvement on intellectual and school status, anxiety, behavior, physical appearance and physical attributes. Also, was reported statistically significance about enhancement of memory. The

study of Koirala et al (27) reported a positive effect of physical activity on the alterations provoked by epilepsy on the brain functional connectivity of the participants.

One of the studies (22) reported an improvement on quality of life through World Health Organization Quality of Life instrument and a strong effect in the Satisfaction with Life Scale, but it was not significant over time. Another study (23) utilized the Quality of Life in Epilepsy instrument and registered a significative score comparing the baseline and the reassessment of the exercise group.

Table 1

Summary of included studies.

Study	Design	Participants and groups allocation	Intervention		Outcome measures
			Frequency and duration	Type of exercise	
Nakken et al. 1990	CT	n: 21; Age range: 18-39 yr; Gender: 11 F; 10 M; Type of epilepsy: generalized epilepsy: 6; partial epilepsy: 15; Seizure frequency: minimum 1 seizure/mth in the previous yr; Onset of symptoms: 20.5 yr.	45 min. 3 times /day, 6 days/wk, 4 wk.	Aerobics; Swimming; Jogging; Hiking; Volleyball; Horseback riding; Table tennis; Bicycling; Rowing.	Aerobic capacity; Seizure susceptibility; Antiepileptic drugs (AED) serum level; Timing: 0; 8 wk.
Esquivel et al., 1991	CT	n: 18; Age range: 6-17 yr; Gender: 7 F; 11 M; Type of epilepsy: absence epilepsy: 18; Seizure frequency: 8 per day	63 min;	Rest: 15 min; Physical exercise: 15 min; Recovery: 30 min; Voluntary hyperventilation: 3 min.	Number of absences; AED serum level; Seizure frequency;

		(median); Onset of symptoms: NR.			Timing: 0; 63 min.
Eriksen et al., 1994	CT	n: 14; Age range: 18-46 yr; Gender: 14 F. Type of epilepsy: partial epilepsy: 12; generalized epilepsy: 3; Seizure frequency: 2.9 per wk (median); Onset of symptoms: 22 yr.	60 min, twice/wk, 15 wk.	Ergonomics; Warmup; Aerobic dancing; Cool down; Stretching; Strength training; Relaxation.	Maximum 0^2 uptake; Lactate; Borg Scale; Blood Pressure; Heart Rate; Blood sample: triglycerides and cholesterol; Vital capacity; Washington Psychosocial Seizure Inventory; Spielberger State-Trait Anxiety Inventory; Beck's Depression Inventory; Locus of control; Ursin Health Inventory; Seizure frequency; Timing: 7-3; 0; 3 mth.
Panjwani et al., 1995	CT	n: 32;	20-30 min; twice a day; 6 mth.	EG I: Sahaja Yoga;	Level of stress;

		Age range: 15-35 yr; Gender: 30 F; 2 M; Type of epilepsy: generalized tonic epilepsy: 25; simple partial epilepsy: 5; complex partial epilepsy: 2; Seizure frequency: greater than 4 seizures in 3 mth; Onset of symptoms: Experimental Group (EG) I: 7.3 yr; EG II: 5.6 yr; EG III: 4.2 yr.		EG II: mimicking exercises; Control Group (CG): no intervention.	Sympathetic activity; Timing 0; 3; 6 mth.
Rajesh et al.,2006	CT	n: 20; Age range: 15-47 yr; Gender: 6 F; 14 M; Type of epilepsy: complex partial epilepsy; Seizure frequency: 5.4 per mth (median); Onset of symptoms: 12.7/yr.	20 min (unsupervised sessions); twice/day + Once/wk (supervised sessions); 3 mth.	*Nadishodana pranayama:* 5–7 min; Silent meditation.	Seizure frequency; Timing: 0; 3; 6; 12 mth.
Conant et al., 2008	Pilot study	n: 9; Age range: 8-16 yr; Gender: 7 F; 2 M; Type of epilepsy: complex partial epilepsy: 5; generalized tonic clonic epilepsy: 2; absence epilepsy: 2; Seizure frequency: NR;	1h/wk; 10 wk.	Kempo Karate	Intellectual and school status improvement; Health-related quality of life; Timing: 0; 10 wk.

		Onset of symptoms: Minimum 1 yr prior the study.			
Eom et al., 2014	Pilot study	n:10; Age range: 8-12 yr; Gender: 6 F; 4 M; Type of epilepsy: benign epilepsy with centrotemporal spikes: 10; Seizure frequency: no seizures for the last one year (8), less than one seizure per year (2); Onset of symptoms: NR.	Supervised session: 3h; 2 activities: 90 min each. Unsupervised session: 15-20 min. 5 wk.	Basketball; Soccer; Table tennis; Badminton; Jump rope; Line dancing; Sit-ups; Push-ups.	Wechsler Intelligence Scales for Children -Third Edition; Comprehensive Attention Test; Children's Color Trails Test; Children's Depression Index; Revised Children's Manifest Anxiety Scale; Quality of Life in Childhood Epilepsy; Korea-Child Behavior Checklist; Korean version of the Quality of Life in Childhood Epilepsy; Timing: 0; 5 wk.
Koirala et al., 2017	CT	n: 8; Age range: 8-12 yr; Gender: 5 F; 3 M; Type of epilepsy: benign epilepsy; Seizure frequency: maximum 1 seizure in the previous year; Onset of symptoms: NR.	3h; 2 supervised sessions/wk. Unsupervised sessions: 15–20 min. 5 wk.	Gym exercise; Soccer; Basketball; Jump rope; Dance; resistance exercises.	Current source density and source localization measures; Brain functional connectivity; Correlation between functional connectivity and neuropsychological tests; Timing: 0; 5 wk
Lundgren et	RCT	n: 18;	2-4 sessions	Acceptance	Seizure

al., 2008		Age range:18-55 yr; Gender: 6 F; 12 M; Type of epilepsy: generalized tonic clonic epilepsy: 12; partial complex epilepsy: 5; myoclonic jerks: 1; Seizure frequency: minimum of three seizures during the previous 3 mth; Onset of symptoms: NR.	per wk. 12 mth.	and Commitment Therapy group: 2 sessions; Yoga group: 4 sessions.	frequency; Seizure index; Quality of life; Timing: - 3; 0, 3; 6 12 mth.
McAuley et al., 2001	RCT	n: 23; Age range: 16-60 yr; Gender: 17 F; 6 M; Type of epilepsy: generalized tonic clonic epilepsy: 6; complex partial epilepsy: 12; simple partial epilepsy: 5; Seizure frequency: 0-8 in the previous 4 wk; Onset of symptoms: NR.	1 h; 12 wk; 3 sessions/wk.	EG: cardiovascular; strength; flexibility training; CG: no intervention.	Seizure activity; AED concentrations; Quality of Life in Epilepsy; Profile of Mood States; 10-item Rosenberg Self-Esteem Scale; Physical Self-Description Questionnaire; Timing: - 4; 0; 12 wk.
Sathyaprabha et al., 2008	CT	n: 176; Age range: 15-55 yr; Gender: 14 F; 20 M. Control groups: NR Type of epilepsy: refractory epilepsy; Seizure frequency: greater than 2 seizures/mth for at	10 wk, 1h/day.	EG I: pranayama + yogasana; EG II: non-yoga: meditation + physical exercise; CG: no intervention.	Autonomic dysfunction; Timing: 0; 10 wk.

	least 2 years; Onset of symptoms: EG I: 19.9 yr; EG II: 19.1 yr.		

Abbreviations: CT: controlled trial; YR: year; M: male; F: female; MTH: month; MIN: minute; WK: week; AED: antiepileptic drug; NR: not reported; VO^2max: EG: experimental group; CG: control group; RCT: randomized controlled trial.

Discussion

This integrative review aimed to verify if physical exercise could positively or negatively influence the seizure frequency and QoL in PWEs. Sometimes, the familiar circle and caretakers worry about and discourage the individual with epilepsy from engaging in physical activity for fear that it will precipitate or facilitate the occurrence of seizures. Consequently, PWEs, children, and adolescents are sedentary or less physically active than the general population (30). Consequently, PWEs are more propensity to obesity, hypertension, diabetes, and coronary artery disease in their adult lives (31).

In the studies included in this review, we found evidence that most physical activities, gym exercises, and indoor/ outdoor games are secure for PWEs subjects (18, 25). The principal clinician's preoccupation is the triggering of seizures during the exercise. Hyperventilation is a physiological response to increased metabolic demand that seems to lead directly to triggering seizure events (31), For this reason, not all physical activities are adequate for PWEs subjects (17). Therefore, the accompaniment of trained professionals is crucial for the safety of PWEs subjects during physical exercise practice, according to ILAE (17, 30).

According to some studies, complementary treatments, such as Yoga practice, may reduce seizure occurrence or decrease the long-term psychiatric effects of pharmacological therapy, for example, anxiety and depression (32). These positive results may be explained by the effect on autonomic functions such as heart rate, decrease in stress, and abnormal neuronal activity (22, 24). All these improvements cause well-being feeling and reduce risk factors for the occurrence of seizures. Yoga practice may be an adjuvant therapy for pharmacological therapy to PWEs subjects.

Regarding the quality of life of PWEs, some studies included in this review reported an improvement in the quality of life, in the short term, of physiological and psychological domains. Some physiological changes caused by physical exercises, such as body weight loss, physical fitness improvement, and a decrease in blood pressure, and glycemia level, may result in self-image, self-acceptance, and self-esteem improvement (18). Psychological changes, such as mood state and anxiety level, were also reported (19).These improvements can positively impact social participation and the quality of life of PWEs subjects

This study has some limitations that need to be highlighted. Although we stipulated specific eligibility criteria, there is significant heterogeneity presented in the population presented in this review. Even though all of them were diagnosed as PWEs, there is heterogeneity due to differences in age ranges included in studies (for example, children, adolescents, adults, and elderly) with distinct types of epilepsy. It may be a barrier to establishing a better exercise routine for every subgroup. It has not been possible to make a meta-analysis due to the limited number of articles published about the topic.

Conclusion

This integrative review of clinical trials concluded that physical exercise has a positive impact on seizure frequency of PWEs for it presents a protective outcome against risk factors for seizure occurrence. Secondarily, we concluded that physical therapy has a positive impact on QoL of PWEs by preventing comorbidities and emotional damage caused by the neurological condition.

Therefore, this integrative review points out that PWEs subjects may rely on the safety of practicing physical exercises and having an active lifestyle, avoiding putting themselves in additional physical danger that are risk factors for seizure occurrence.

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ANEXOS

ANEXO A

NORMAS DA REVISTA ESCOLHIDA PARA SUBMISSÃO DO ARTIGO

Aims & Scope

The ***CJNS*** is a widely circulated, internationally recognized medical journal that publishes peer-reviewed articles in neurology and neurosciences. Articles are published in English with abstracts in both English and French. The Journal is published in January, March, May, July, September, and November in an online format.

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