

Effectiveness of laughter therapy on anxiety and depression in hospitalized patients: a systematic review and meta-analysis

Joselin Valeska SOBALVARRO¹ , Gustavo Alexandre PEREIRA¹ , Ana Paula DOMINICCI¹ , Genival Araújo dos SANTOS-JUNIOR² ,
Jéssica Daniel SILVA¹ , Marina BAVARESCO¹ , Tiago Marques dos REIS¹ 

¹ Faculty of Pharmaceutical Sciences, Federal University of Alfenas (Alfenas Minas Gerais);

² Federal University of Espírito Santo (Alegre, Espírito Santo).

Corresponding author: Reis TM, tiago.reis@unifal-mg.edu.br

Submitted: 30-12-2022 Resubmitted: 18-05-2023 Accepted: 24-05-2023

Peer review: blind reviewer and Renata Rezende de Menezes

Abstract

Objective: To verify the effectiveness of laughter therapy on anxiety and depression in hospitalized patients. **Methods:** A systematic review of experimental studies and quasi-experimental studies was carried out after being registered in the PROSPERO database (CRD42020138934). The search was performed in September 2022 in PubMed, Web of Science, Lilacs, Cochrane Library and Scopus. Inclusion criteria were: a) hospitalized patients who experienced anxiety or depression and who underwent at least one session of laughter therapy, b) studies with outcomes of laughter therapy on anxiety and depression. The studies were selected in two stages: by reading the titles and abstracts of the studies, and by reading the full papers that met the eligibility criteria. The risk of bias of the studies was assessed using the RoB 2 and ROBINS-I tools. The quality of the evidence synthesis was measured by GRADE. **Results:** 4,472 studies were found and 15 of them were included. Laughter therapy was shown to be effective in reducing anxiety and depression in both hospitalized children and adults. Ten were randomized controlled trials (nine of them were at high risk of bias) and five were quasi-experimental studies. Meta-analysis showed significant improvement in anxiety (mean difference = -10.55, 95% CI: -19.97, -1.14, p 0.03, I² = 84%) and depression (mean difference = -2.43, 95% CI: -3.63, -1.24, p <0.0001, I² = 0%). **Conclusion:** According to the findings of this study, it was verified that laughter therapy seems to be more effective than standard care for reducing anxiety and depression in hospitalized patients. However, further studies with low risk of bias are required.

Keywords: Anxiety; Depression; Inpatients; Laughter therapy.

Efetividade da terapia do riso na ansiedade e depressão em pacientes hospitalizados: uma re-visão sistemática e meta-análise

Resumo

Objetivo: Verificar a efetividade da terapia do riso na ansiedade e depressão em pacientes hospitalizados. **Métodos:** Foi realizada uma revisão sistemática de estudos experimentais e quase-experimentais após registro na base de dados PROSPERO (CRD42020138934). A busca foi realizada em setembro de 2022 no PubMed, Web of Science, Lilacs, Cochrane Library e Scopus. Os critérios de inclusão foram: a) pacientes hospitalizados que apresentavam ansiedade ou depressão e que se submeteram a pelo menos uma sessão de terapia do riso, b) estudos com resultados da terapia do riso sobre ansiedade e depressão. A seleção dos estudos ocorreu em duas etapas: pela leitura dos títulos e resumos dos estudos e pela leitura dos artigos completos que atenderam aos critérios de elegibilidade. O risco de viés dos estudos foi avaliado usando as ferramentas RoB 2 e ROBINS-I. A qualidade da síntese da evidência foi medida pelo GRADE. **Resultados:** foram encontrados 4.472 estudos e 15 deles foram incluídos. A terapia do riso mostrou-se efetiva na redução da ansiedade e da depressão em crianças e adultos hospitalizados. Dez eram ensaios clínicos randomizados (nove deles com alto risco de viés) e cinco eram estudos quase-experimentais. A metanálise mostrou melhora significativa na ansiedade (diferença média = -10,55, IC 95%: -19,97, -1,14, p 0,03, I² = 84%) e depressão (diferença média = -2,43, IC 95%: -3,63, -1,24, p <0,0001, I² = 0%). **Conclusão:** De acordo com os achados deste estudo, verificou-se que a terapia do riso parece ser mais efetiva do que o tratamento padrão para reduzir a ansiedade e a depressão em pacientes hospitalizados. No entanto, mais estudos com baixo risco de viés são necessários.

Palavras-chave: Ansiedade; Depressão; Pacientes internados; Terapia do riso.



Introduction

Depression and anxiety are of great interest worldwide because these symptoms are presented in a number of chronic diseases. The prevalence of depressive symptoms in patients with chronic obstructive pulmonary disease, chronic hepatitis B, rheumatoid arthritis and HIV/AIDS, for example, was higher than in controls without these diseases.¹⁻⁶ However, it is observed that symptoms of anxiety and depression worsen in cases where these patients are hospitalized. Actually, anxiety and depression intensifies the pain and sadness common to the hospital setting. Nonetheless, humor, music and play activities seem to have the potential to alleviate suffering and recover health.⁷⁻⁹

In this context, laughter therapy is a non-pharmacological intervention for healthy recovery that have been consolidated in developed and developing countries.¹⁰ They sing songs, tell stories or develop other types of playful activities in order to provide joy and humor to hospitalized patients, as well as to their families, companions and to health team of health facilities. Laughter therapy comprises physical exercises, relaxation techniques and simulated vigorous laughter through activities such as massages, games, listening to jokes, drawings and other recreational activities with clowns that promote emotional freedom. It can be understood as a complement to the various forms of non-invasive, complementary and alternative medicine such as yoga, meditation and mindfulness. Although some of its benefits may be similar to those observable from spontaneous and genuine laughter, laughter therapy is a planned and deliberate intervention.¹¹⁻¹³

Although time has promoted a technological and conceptual revolution in the way of understanding human behavior, the understanding of the outcomes that laughter can cause in people's health remains an object of study of science. Authors state that humor is a relevant coping mechanism in patients' lives and its beneficial effects are observed even at the end of life.^{14,15} An analysis of the speech of the parents of children hospitalized in Germany showed that the visit of the clown doctors was able to raise the morale and relieve the children's stress, highlighting the hypothesis that laughter therapy may be able to humanize the scenario in which the patient is submitted.¹⁶ Likewise, the stand up comedy training showed significant effectiveness in relation to the participants' self-esteem.¹⁷ This serves as a support for people to deal with the fear and concerns inherent to the health problems they face, especially when treatment involves hospitalization.

Laughter therapy may directly influence clinical conduct of all health care professionals, decrease hospitalization time and increase the saving of health resources, in addition to promoting a realignment of professional training in the health area and optimizing the work carried out by clown doctors.¹⁸ Although there is evidence in the literature on the benefits of laughter therapy in various age ranges and in different clinical situations, in which hospitalized patients must face and overcome certain procedures, there is still no research that synthesizes individual studies and combines statistical results on anxiety or depression suffered by patients during their hospitalization period. Thus, the aim of this study was to verify the effectiveness of laughter therapy on anxiety or depression in hospitalized patients. It seeks to answer the following question: Is the inclusion of laughter therapy in the therapeutic regimen more effective than the exclusive offer of usual care in the control of anxiety or depression in hospitalized patients?

Methods

This is a systematic review of experimental studies (randomized controlled trials) and quasi-experimental studies (non-randomized controlled trials, before and after studies). The acronym PICOS was used to formulate the research question (Supplementary material A). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)¹⁹ checklist was used to report the study. This systematic review was registered on the PROSPERO database (CRD42020138934).²⁰ In this study, laughter therapy was considered the use of any non-pharmacological intervention that included physical exercises, relaxation techniques or vigorous simulated laughter through strategies involving clowns or the health team.^{21,22}

The search for studies was carried out on September 11, 2022 in the databases PubMed, Web of Science, Lilacs, Cochrane Library and Scopus, without language restriction or year of publication. Manual screening was also performed. MeSH descriptors and DeCS were crossed using the Boolean operators OR (intracategories) and AND (intercategories) according to the particularities of each database (Supplementary material B). No descriptors were listed for comparators and outcomes and no filters were used in the databases to increase the sensitivity of the search.^{23,24}

Study selection

The papers found were submitted to the reading of titles and abstracts. The selected studies were read in full to verify that they met the eligibility criteria. The selection of the studies was carried out by two investigators independently (GACP and APAD) and the differences were resolved by consensus with a third researcher (TMR).

Eligibility criteria

Experimental studies (randomized controlled trials) and quasi-experimental studies (non-randomized controlled trials, before and after studies) that met the following inclusion criteria were included in the research: a) hospitalized patients who experienced anxiety and depression and who underwent at least one session of laughter therapy, b) studies with outcomes of laughter therapy on anxiety or depression. In the case of studies that were not fully available, the researchers contacted the authors requesting the full text. In the absence of a response, a new contact was made after seven days. In situations where there was no response after the second contact, the study was excluded from the research. The Rayyan software was used to eliminate duplicates and select studies.²⁴

Data extraction

A table prepared in Microsoft Excel by the researchers themselves was used to collect data. The following data were extracted: author, year, country, type of study, age of participants, length of hospital stay, type or technique of laughter therapy used, number of laughter therapy sessions offered, duration of laughter therapy sessions, team involved in offering laughter therapy sessions. Outcomes of laughter therapy in anxiety and depression in hospitalized patients were also extracted, according to the criteria established in each of the tools used in each of the included studies. Data extraction was performed by the same investigators who selected the studies (GACP and APAD), and the differences were resolved by consensus with a third researcher (JVMS).



Risk of bias assessment

The risk of bias in the included studies was assessed by two researchers of independent way using the Risk of Bias 2 (RoB 2) tool for randomized controlled trials and through the Risk Of Bias In Non-randomized Studies of Interventions (ROBINS-I) tool for quasi-experimental studies.^{23,25} Any discrepancies were aligned with a third researcher.

Quantitative synthesis

Quantitative synthesis was performed through meta-analysis considering the mean difference of continuous variables observed in studies with low or moderate risk of bias, following the fixed effect model for $I^2 < 50\%$ and random for $I^2 > 50\%$ with the statistical method of the inverse of variance to weight the effect estimates between the studies included in the review. Only studies with low and moderate risk of bias were considered in the quantitative synthesis. The Revman 5.3[®] software was used in this step.²⁷

Evaluation of the quality of the evidence synthesis

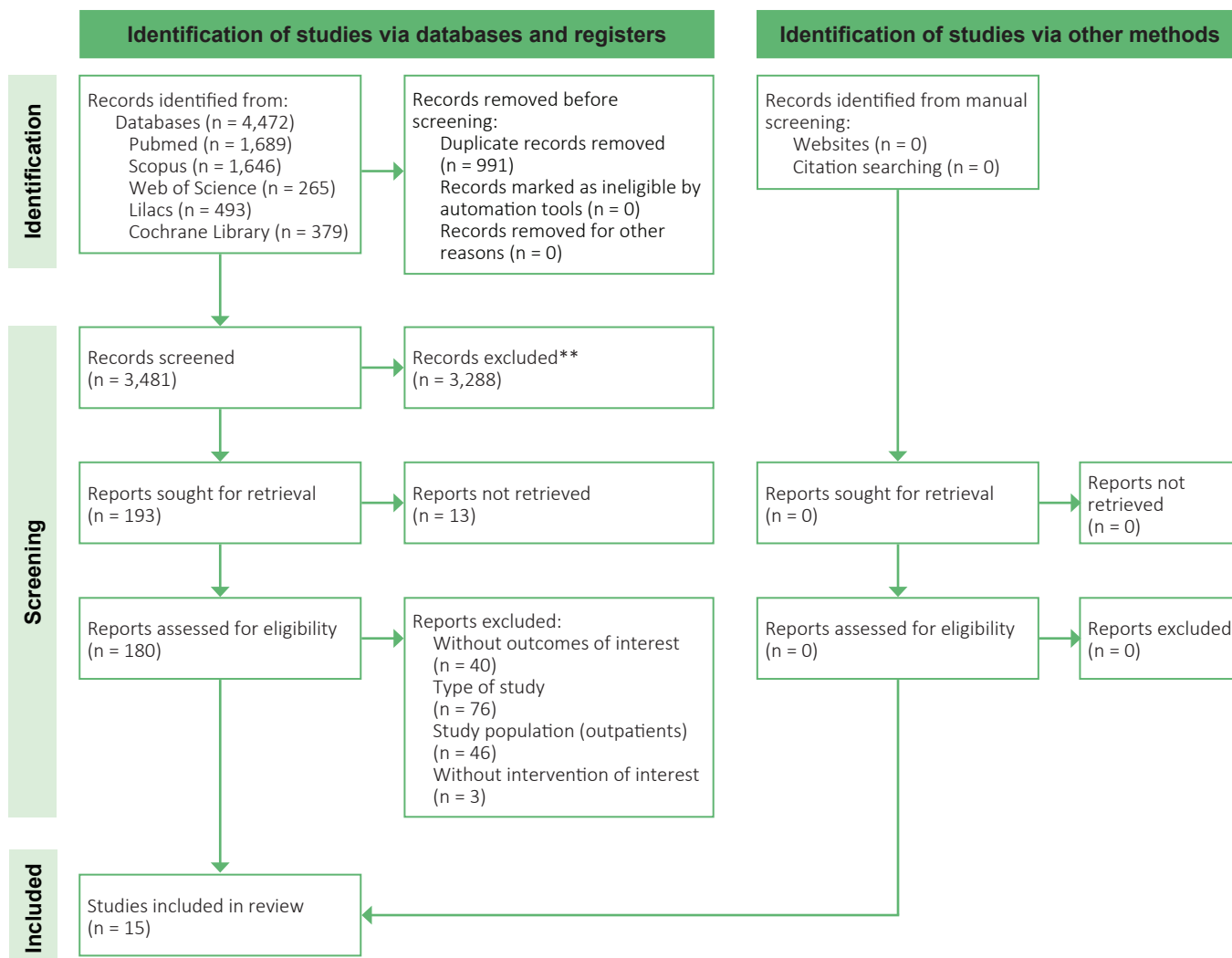
The quality of the evidence synthesis was assessed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) through the GRADE profiler (GRADEpro), a software to facilitate development of evidence summaries and health care recommendations.^{28,29}

Results

Search and selection of studies

In the search carried out in the defined databases, 4,472 studies were identified and 15 were included in the research (Figure 1). The reasons for exclusion of the studies are shown in Supplementary material C.

Figure 1. Flowchart of the study selection process.



Summarizing the characteristics of the studies

Among the included studies, 10 (66.7%) were randomized clinical trials. Most studies were carried out in Italy (n = 6)^{30,31} Israel (n = 3)^{32,33} and South Korea (n = 2)^{34,35}. In addition, most of them (60%) were carried out in children, but there have been studies done with other special populations: elderly^{34,36}, war veterans³⁷ and patients diagnosed with schizophrenia^{32,38}. Almost two-thirds (40.0%) of studies^{30,31} occurred in a pre-surgical settings (Table 1).

In all interventions, the playful was explored using visual and sound resources and body kinetics. The strategies with apparently more favorable effects were free drawing and dramatization, jokes, games with soap bubbles, dolls and magic tricks, word games and humor films, use of body language, sing funny songs, stretch, play with your hands, dance, perform laughter exercises, applaud and laugh out loud, meditate and express thoughts and feelings.

Table 1. Characteristics of the included studies (n = 15).

Author Year Country	Type of study	Age of participants Mean (SD) _{intervention} / Mean (SD) _{control} /p-value	Inpatient care unit	Length of hospital stay Mean (SD) _{intervention} / Mean (SD) _{control} /p-value	Strategy used in LT	Sessions (N)	Duration of sessions (hours)	Team involved in LT
Dionigi <i>et al</i> , 2017, Italy ³⁰	QE	6,11 (2,38)/ 5,32 (1,92)/ 0,11	Pre-surgery	NR	Intervention: Free drawing and dramatization, jokes, soap bubbles, magic tricks, and dolls Control: Standard Assistance	NR	0,33	Group of art therapy and clowns
Dionigi <i>et al</i> , 2014, Italy ³⁹	RCT	NR ¹	Pre-surgery	NR	Intervention: Jokes, soap bubbles, magic tricks and puppets, parody the medical routine Control: Standard Assistance	NR	0,5	Clowns
Dóro <i>et al</i> , 2017, Brazil ³⁶	RCT	34,1 (11,1)/ 32,6 (10,4)/ 0,488	Bone marrow transplant	NR	Intervention: Live music, using music therapy techniques: playing percussion instruments such as bongo, tambourine, bells, triangle or maracas Control: Standard assistance	NR	0,5	Music Therapist
Gelkopf <i>et al</i> , 2006, Israel ³²	QE	42,5 (9,4)/ 46,1 (5,9)/ NR	Psychiatry	NR	Intervention: Only humor films Control: Humor films (15%) and other genres (75%)	60	NR	NA
Gelkopf <i>et al</i> , 1993, Israel ³⁸	RCT	43,76 (13,55)/ 45,12 (13,76)/ NR	Psychiatry	13 (10,98) years / 14,1 (11,94) years / NR	Intervention: Only humor films Control: Humor films (15%) and other genres (75%)	70	NR	NA
Gilboa-Negari <i>et al</i> , 2017, Israel ³³	QE	9,8 (1,49)/ 9,7 (1,5)/ 0,16 ²	Pediatrics	NR	Word games, body language and construction of props with objects found in the room	NR	0,13-0,16	Clowns
Han <i>et al</i> , 2017, South Korean ³⁴	QE	Adults ³	Continuous care	NR ^{#5}	Intervention: Singing funny songs, stretching, playing with hands, dancing, laughing exercises, healthy applause and laughing out loud, positive meditation, expression of thoughts and feelings	8	0,66	Laughter therapist, nurse, social worker
Kopytin <i>et al</i> , 2013, Rússia ³⁷	RCT	Adults ⁴	Specialized psychotherapy	1 month	Intervention: drawing individual and group doodles Control: Occupational Therapy	12-14	2,5	Psychiatrist, psychotherapist, clinical psychologist, nurses
Liguori <i>et al</i> , 2016, Italy ⁴⁰	RCT	8,8 (2,5)/ 8,6 (2,2)/ NR	Pre-surgery	NR	Intervention: video showing doctors Clowns making jokes and touring the operating room Control: Standard Assistance	NR	0,1	Clowns

Table 1. Characteristics of the included studies (n = 15).

Author Year Country	Type of study	Age of participants Mean (SD) ^{intervention} / Mean (SD) ^{control} / p-value	Inpatient care unit	Length of hospital stay Mean (SD) ^{intervention} / Mean (SD) ^{control} / p-value	Strategy used in LT	Sessions (N)	Duration of sessions (hours)	Team involved in LT
Lim <i>et al</i> , 2014, South Korean ³⁵	QE	NR	Burned	NR	Intervention: Technique of emotional freedom, praise, songs, dances and video with exercises for facial muscles	4	1	Professional therapist
Messina <i>et al</i> , 2014, Italy ⁴¹	RCT	NR	Pre-surgery Pediatrics	NR	Intervention: funny activities (clowns) Control: Play or watch a cartoon	NR	NR	Clowns
Özgür <i>et al</i> , 2017, Turkey ⁴²	RCT	8,34 (1,9) / 7,11 (5,7) / NR	Pediatrics	7,16 days (5,7) / 4,88 days (1,91) / NR	Intervention: Giving a handkerchief when the child cries, providing tactile comfort, singing, playing games, sketches, dramas, reading stories Control: Standard Assistance	NR	NR	Clowns
Phipps <i>et al</i> , 2012, Canada/USA ⁴³	RCT	NR ⁶	Pediatric stem cell transplantation	NR	Intervention: Massage, relaxation and mood therapy for children; massage Control: Standard Assistance	12	0,5	Massage therapist
Vagnoli <i>et al</i> , 2010, Itália ⁴⁴	RCT	7,04 (2,23) / 8,04 (2,11) / 7,36 (2,61) / 0,306 ⁷	Pre-surgery	NR	Intervention 1: Magic tricks, jokes, music, games, dolls, word games and soap bubbles. Control: Standard Assistance	NR	0,25	Clowns
Vagnoli <i>et al</i> , 2005, Itália ³¹	RCT	6,85 (2,21) / 7,30 (2,72) / 0,569	Pre-surgery	NR	Intervention: Magic tricks, jokes, music, games, dolls, word games, soap bubbles Control: Standard Assistance	NR	0,25	Clowns

SD: standard deviation; LT: Laughter therapy; RCT: Randomized clinical trial; QE: Quasi-experimental study; NR: Not reported; NA: Not applicable. 1: Used the median (minimum-maximum) Intervention / Control / p-value: 5.7 (2.1–12.5) / 6.0 (2.6–10.7) / 0.349 2: Compared the same intervention in two populations: Average (Standard deviation) Jewish / Bedouin / p-value 3: n (%) Intervention / Control / p-value by age group: 65–79 years: 12 (63.2) / 10 (55.6) / 0.446; ≥80 years: 7 (36.8) / 8 (44.4) / NR. 4: n (%) Intervention / Control by age group: 20–29 years: 15 (29%) / 13 (26%); 30–39 years: 29 (47%) / 23 (47%); 40–49 years: 10 (16%) / 9 (18%); 50+ years: 8 (13%) / 5 (10%). 5: n (%) Intervention / Control / p-value for years of hospitalization: ≤1 year: 11 (57.9) / 11 (61.1) / 0.554; > 1 year: 8 (42.1) / 7 (38.9) / NR. 6: They presented % of the age group of the three evaluated groups: Intervention children / Intervention child and parents / Control p-value: 0.79. 6–12 years: 46.6 / 48.2 / 52.6; > 12 years: 53.4 / 51.8 / 47.4. 7: Three groups were evaluated: Children: Intervention 1 / Intervention 2 / Control.

Risk of bias assessment

Among the randomized controlled trials, one had a low risk of bias⁴⁰ and the others^{31,36–38,41–44} a high risk (Table 2; Supplementary material D; Supplementary material F). In quasi-experimental studies, 60% had a moderate risk of bias^{32–34} and the others varied between low³⁰ and critical risk³⁵ (Table 2; Supplementary material E; Supplementary material G). There was a lack of assessment of confounding factors,⁴⁰ lack of a parallel control group,^{33,41} use of several scales in the same study³⁷ and different scales for almost all studies.

Quantitative synthesis

It was observed that laughter therapy appeared to be more effective than the exclusive use of standard assistance in reducing anxiety and depression in hospitalized patients, (Supplementary material H; Supplementary material I). Meta-analysis showed

significant improvement in anxiety (mean difference = -10.55, 95% CI: -19.97, -1.14, p 0.03, I² = 84%) and depression (mean difference = -2.43, 95% CI: -3.63, -1.24, p <0.0001, I² = 0%) in hospitalized patients using laughter therapy.

Quality of the evidence synthesis

The certainty of the evidence had its level classified between low and very low (Supplementary material J). Both the nine randomized controlled trials and the four quasi-experimental studies that analyzed anxiety as an outcome obtained a low level of certainty of evidence. In the studies that analyzed depression, those with a randomized controlled trial design also obtained a low level of certainty of evidence and the quasi-experimental ones were classified with a very low level.



Table 2. Outcomes and measures of effect of the included studies (n = 15).

Author, year	Participants (N)	Outcome	Instrument used to measure the outcome	Effect measure Intervention: Mean (SD) _{before} / Mean (SD) _{after} / p-value Control: Mean (SD) _{before} / Mean (SD) _{after} / p-value	Risk of bias ^{A*}
Dionigi <i>et al</i> , 2017 ³⁰	Intervention: 37 Control: 41	Anxiety	Modified Yale Preoperative Anxiety Scale (mYPAS) in waiting room and at the entrance to the operating room	40,68 (14,33)/ 31,71 (10,81)/ < 0,001\$ 37,20 (15,05)/ 46,67 (16,77)/ < 0,001	Low
Dionigi <i>et al</i> , 2014 ³⁹	Intervention: 52 Control: 25	Anxiety	Modified Yale Preoperative Anxiety Scale (mYPAS)	50 (23-97)/ 33 (23-97)/ 0,004 33 (23-83)/ 43 (23-100)/ NR*	High
Dóro <i>et al</i> , 2017 ³⁶	Intervention: 50 Control: 50	Anxiety	Analogic visual scale (VAS)	2,4 (1,8)/ 4,4 (2,0)/ <0,001**	High
Gelkopf <i>et al</i> , 2006 ³²	Intervention: 15 Control: 14	Depression	Calgary Depression Scale for Schizophrenia (CDSS)	3,8 (5,7)/ 2,6 (5,5)/ <0,05 3,4 (4,4)/ 3,6 (4,1)/ NR	Moderate
		Anxiety	State Anxiety Inventory	44,2 (5,1)/ 40,1 (4,6)/ < 0,001 42,8 (7,7)/ 43,1 (6,1)/ NR	
Gelkopf <i>et al</i> , 1993 ³⁸	Intervention: NR Control: NR	Depression	The Multiple Affect Adjective Check List (MAACL)	36,44 (4,80)/ 34,16 (3,85)/ > 0,05 36,18 (5,19)/ 35,87 (5,41)/ NR	High
		Anxiety		32,10 (3,27)/ 31,55 (3,42)/ > 0,05 32,06 (3,76)/ 32,18 (4,12)/ NR	
Gilboa-Negari <i>et al</i> , 2017 ³³	Jewish: 39 Bedouin: 50	Anxiety	Subjective units of distress (SUDS) children's anxiety level	3,79 (3,43)/ 2,74 (2,84)/ 0,001*** 3,56 (1,49)/ 1,68 (0,98)/ 0,000***	Moderate
Han <i>et al</i> , 2017 ³⁴	Intervention: 19 Control: 18	Depression	Geriatric Depression Scale Short Form-Korea (GDSFF-K)	8,37 (1,54)/ 5,32 (1,20)/ <0,001 8,17 (1,98)/ 7,94 (2,49)/ 0,429	Moderate
Kopytin <i>et al</i> , 2013 ³⁷	Intervention: 62 Control: 50	Anxiety	Symptomatic checklist SCL-90:	1,05 (0,10)/ 0,47 (0,07)/ < 0,05	High
		Depression	Depression	1,00 (0,09)/ 0,67 (0,10)/ NR	
			Symptomatic checklist SCL-90: Anxiety	1,06 (0,10)/ 0,44 (0,07)/ NR 1,07 (0,12)/ 0,61 (0,10)/ NR	
			Symptomatic Checklist SCL-90: Phobic Anxiety	0,56 (0,09)/ 0,28 (0,07)/ NR 0,56 (0,08)/ 0,34 (0,08)/ NR	
			Questionnaire of depressive conditions: Depression-no depression scale	79,76 (3,07)/ 66,18 (2,59)/ < 0,05 81,32 (3,51)/ 73,69 (3,05)/ NR	
			Questionnaire of depressive conditions: Endogenous-neurotic depression scale	40,73 (1,50)/ 47,12 (1,46)/ > 0,05 42,52 (1,96)/ 45,22 (2,03)/ NR	
			Integrative Anxiety Test: Personality anxiety: General index	7,57 (0,23)/ 4,44 (0,38)/ < 0,005 7,48 (0,24)/ 6,56 (0,36)/ NR	
			Integrative Anxiety Test: Situational Anxiety: General index	6,64 (0,31)/ 3,58 (0,35)/ < 0,05 6,33 (0,44)/ 5,28 (0,46)/ NR	
Liguori <i>et al</i> , 2016 ⁴⁰	Intervention: 20 Control: 20	Anxiety	Modified Yale Preoperative Anxiety Scale (m-YPAS)	37,3 (21,7)/ 37,1 (13,8)/ NR/ > 0,05# 33,0 (18,4)/ 48,6 (15,9)/ 15,6/ 0,009#	Low
Lim <i>et al</i> , 2014 ³⁵	Intervention: 30 Control: 30	Anxiety	Anxiety trace-state inventory (STAI)	64,36 (8,89)/ 38,13 (5,33)/ < 0,001 63,66 (10,46)/ 60,36 (6,37)/ 0,190	Critic
		Depression	Depression Scale Lee Joong-hoon (1995)	58,90 (9,42)/ 38,83 (5,7)/ < 0,001 56,90 (8,87)/ 59,50 (4,41)/ 0,138	
Messina <i>et al</i> , 2014 ⁴¹	Intervention: 444 Control: 441	Anxiety	Modified Yale Preoperative Anxiety Scale (m-YPAS) in waiting room	29,48 (3,667)/ 31,12 (3,507)/ 0,0018##	High
			Modified Yale Preoperative Anxiety Scale (m-YPAS) in induction room	29,29 (5,500)/ 30,34 (4,705)/ 0,1558##	
Özgür <i>et al</i> , 2017 ⁴²	Intervention: 50 Control: 49	Anxiety	State-Anxiety Inventory for the children (STAI-C)	47,14 (8,16)/ 43,14 (5,83)/ 0,004 45,06 (6,91)/ 48,22 (6,46)/ 0,014	High
		Depression	Trait-Anxiety Inventory for the children (STAI-C)	35,78 (6,29)/ 35,78 (8,14)/ 0,999 34,81 (6,39)/ 37,51 (7,35)/ 0,009	
			Beck Depression Inventory for the children (BDI)	29,66 (15,41)/ 27,54 (5,33)/ 0,330 26,06 (4,45)/ 28,32 (6,92)/ 0,005	

Table 2. Outcomes and measures of effect of the included studies (n = 15). (continued)

Author, year	Participants (N)	Outcome	Instrument used to measure the outcome	Effect measure Intervention: Mean (SD) _{before} / Mean (SD) _{after} / p-value Control: Mean (SD) _{before} / Mean (SD) _{after} / p-value	Risk of bias ^{A*}
Phipps <i>et al</i> , 2012 ⁴³	Intervention children: NR Intervention children and parents: NR Control: NR	Depression	The Children's Depression Inventory (CDI)	8,5 (5,6) / 5,1 (3,9) / < 0,001 ^{#*} 7,9 (7,4) / 6,9 (7,6) / < 0,001 ^{#*} 7,5 (6,2) / 4,8 (5,1) / < 0,001 ^{#*}	High
Vagnoli <i>et al</i> , 2010 ⁴⁴	Intervention 1: 25 Intervention 2: 25 Control: 25	Anxiety	Anxiety of the child in the waiting room (m-YPAS) Anxiety of the child in the induction room (m-YPAS)	29,48 (10,47) / 37,40 (13,13) / 34,96 (14,39) / 0,088 ^{###} 33,16 (18,82) / 49,72 (22,86) / 65,40 (24,97) / 0,000 ^{###}	High
Vagnoli <i>et al</i> , 2005 ³¹	Intervention: 20 Control: 20	Anxiety	Anxiety of the child in the waiting room (m-YPAS) Anxiety of the child in the induction room (m-YPAS)	30,95 (11,34) / 35,95 (15,64) / 0,254 [*] 37,50 (21,48) / 68,25 (28,42) / 0,000 [*]	High

^A *: RoB-1 tool was used for randomized clinical trials and ROBINS-I tool for quasi-experimental studies. *: Did not present mean (Standard deviation), was expressed in Outcome (minimum-maximum) Before: Intervention / Control / p-value; Then: Intervention / Control / p-value. **: The outcomes were presented as follows: Mean (Standard deviation): Intervention / Control / p-value.***: The two groups of participants received Intervention, and presented the Jewish Average (Standard Deviation): Before / After / p-value; Bedouin: Before / After / p-value. #: The outcomes were presented as follows: Mean (Standard deviation) Before: Intervention / Control / Difference of means / p-value; Then: Intervention / Control / Difference of means / p-value. ##: The outcomes were presented as follows: Mean (Standard deviation) Intervention / Control / p-value; # *: Participants were divided into three groups and presented the data as follows: Mean (Standard deviation) Child intervention: Before / After / p-value; Child and parent intervention: Before / After / p-value; Control: Before / After / p-value. ### **: Participants were divided into three groups and presented the data as follows: Mean (Standard deviation) Intervention 1 / Intervention 2 / Control / p-value; [] *: The outcomes were presented as follows: Mean (Standard deviation) Intervention / Control / p-value

Discussion

The inclusion of laughter therapy in the therapeutic regimen of hospitalized patients proved to be more effective than the exclusive use of usual care in minimizing the anxiety and depression that affect individuals hospitalized in these health facilities. This was observed in a study on covid-19 associated with depression and anxiety, in which laughter therapy was applied with different techniques and reduced anxiety and depression in these patients.⁴⁵ Nevertheless, such emotions as anxiety and depression may be less prevalent in other groups of people, as was presented in a study of the Vietnamese population, where only 4.9% and 7.0% showed depression and anxiety, respectively.⁴⁶ However, despite being a lower prevalence than expected in comparison with other studies, this population could benefit from receiving a type of intervention, such as laughter therapy, presenting humorous films and showing relaxation techniques to perform in the company of their families.

The effectiveness of laughter therapy was verified in different age groups, although studies carried out in adults have shown heterogeneity, including in relation to the cognitive and emotional vulnerability of the participants.^{2,32,34,36-38} In this context, children seem to benefit more from the effects of laughter therapy on anxiety and depression, especially in pre-surgical settings.^{30,31,39,40,44} It is known that approximately 50% of children undergoing surgical procedures report anxiety in inducing anesthesia.^{47,48} Considering the positive results of laughter therapy in this clinical situation⁴⁹, it appears that the application of this intervention before surgical procedures can avoid adverse outcomes and negative post-surgical sequelae associated with anxiety, such as emotional and dream disorders, cognitive inefficiency, behavioral deficit and disobedience.^{50,51-}

Some of the benefits of laughter therapy have also been observed through the program called Big Apple Circus Clown Care Unit, which employs about 90 clowns trained in laughter therapy and provides therapeutic and emotional support to hospitalized

children and their families.⁵² In addition, The Gesundheit Institute, Laughter Therapy Program-Evergreen Health and Laughter Therapy Enterprises in the United States, as well as Soccorso Clown located in Italy and The Dream Doctors Project⁵³ in Israel. Laughter therapy practiced by these entities has become popular due to the physical and psychological effects on the well-being of hospitalized patients, such as improvement in cognitive skills, anxiety, depression and self-esteem.^{54,55} This highlights the success of laughter therapy in the hospital environment and its acceptability among patients.⁵⁶ This was also observed in elderly people living in nursing homes, as there was a statistically significant improvement in depression following the implementation of laughter therapy.⁵⁷

However, despite these benefits, the results of this systematic review should be interpreted with caution, due to some limitations found in the included studies, as there was significant heterogeneity and risk of bias in the included primary studies. In most of them, the lack of standardization of the clowns' intervention, including comparisons involving the same intervention in different groups instead of comparing with traditional therapy, and the measurement of results were also factors identified as generators of heterogeneity.^{30,33,40}

On the other hand, obtaining data from interventions performed in different hospitals also compromised the generalizability of results regarding the improving of depression in the elderly.^{34,43} In the study in which the sample consisted of hospitalized people with schizophrenia³⁸, contradictory results in relation to the outcomes of interest were verified because the data collection was carried out from two different perspectives (self-assessment of health status by patients and assessment of clinical condition by nurses responsible for patient care) and the cognitive impairment of the sick group may have interfered with the measurement of levels of anxiety and depression.

In addition, most of the studies found were carried out with a limited sample size.^{32,34,40} Also, two studies did not report the sample size of the groups selected to receive the intervention.^{38,43}



The limitations found in the systematic review itself come from the difficulties observed in the included primary studies, such as the differences in the units where the laughter therapy sessions were implemented, the lack of information about the length of hospital stay, number and duration of laughter therapy sessions performed, which did not allow us to carry out other analyzes.

However, these are limitations inherent to this type of research. Despite this, this study followed the methodological framework of systematic reviews, which constitute the best level in the hierarchy of levels of evidence. In addition, although there are other systematic reviews addressing laughter therapy, one of the strengths of this research is that is the first systematic review that specifically synthesizes patients hospitalized for any cause and who present anxiety or depression during their hospitalization^{2,58}. Studies with a larger number of patients are needed, involving individuals of different age groups hospitalized in different wards and from different cultures, in order to obtain more reliable and robust results on the effectiveness of laughter therapy in anxiety and depression.

Conclusion

According to the findings of this study, it was verified that laughter therapy was more effective than standard care alone for to control anxiety and depression in hospitalized patients. Despite this, it is noteworthy that most studies presented a high risk of bias and quality of evidence synthesis classified as low to very low. Therefore, studies with better methodological quality are needed to more comprehensively assess the outcomes of laughter therapy in hospitalized patients and generate more compelling evidence about this therapeutic strategy.

Funding sources

This study was supported by the Coordination of Superior Level Staff Improvement- Brazil (CAPES, Finance Code 001).

Collaborators

The authors confirm contribution to the paper as follows: study conception and design: TMR, GACP, MB; data collection: GACP, APAD; analysis and interpretation of results: JVMS, GACP, JDMS, MB, GASJ, TMR; draft manuscript preparation: JVMS, JDMS, GASJ, TMR. All authors reviewed the results and approved the final version of the manuscript.

Conflict of interests statement

We have no conflicts of interest to disclose.

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