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Research Article

The Effectiveness of Ear Acupuncture on Quality of Life and Emotional Disorders in Nursing Professionals During the Covid-19 Pandemic: A Randomized Clinical Trial

Bianca Bacelar Assis Araújo[1*], Caroline de Castro Moura[2], Cissa Azevedo[3], Luciana Regina Ferreira da Mata[4], Ludmila Oliveira Ruela[5], Herica Pinheiro Corrêa[6], Érika de Cássia Lopes Chaves[7], Tânia Couto Machado Chianca[4]

[1]Postgraduate Program in Nursing/Nursing School, Belo Horizonte, Minas Gerais, Brazil

[2]Department of Medicine and Nursing/Federal University of Viçosa, Viçosa, Minas Gerais, Brazil

[3]Nursing School/Dona Lindu Midwest Campus/Federal University of São João del Rey, Divinópolis, Minas Gerais, Brazil

[4]Department of Basic Nursing/Nursing School/Federal University of Minas Gerais, Belo Horizonte, Minas Gerais, Brazil

[5]Postgraduate Program in Nursing /Nursing School of Ribeirão Preto/University of São Paulo, Ribeirão Preto, São Paulo, Brazil

[6]Postgraduate Program in Primary Health Care/State University of Montes Claros, Montes Claros, Minas Gerais, Brazil

[7]Nursing School/Federal University of Alfenas, Alfenas, Minas Gerais, Brazil

***Corresponding Authors:** Bianca Bacelar Assis Araújo, Postgraduate Program in Nursing/Nursing School, Belo Horizonte, Minas Gerais, Brazil.

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Abstract

The objective was to evaluate the effectiveness of ear acupuncture on quality of life and emotional disorders in nursing professionals during the COVID-19 pandemic. This was a clinical trial carried out with 179 professionals, who were randomized into two groups, namely: intervention, which received ear acupuncture, and control, which received no treatment. The Depression, Anxiety, and Stress Scale-21, the Event Impact Scale-Revised, and the World Health Organization Quality of Life-Bref were used. The analysis was carried out using Generalized Estimating Equations. Ear acupuncture improved quality of life and levels of stress, anxiety, and depression in the intervention group compared to the control group.

Keywords: Nursing; Stress; Psychological; Anxiety; Depression; Ear acupuncture

Introduction

The Coronavirus disease (COVID-19) pandemic has emerged as one of the greatest global health challenges of the century, overloading health services worldwide [1]. The hospital setting, in particular, has faced growing demands due to the significant increase in patients affected by the disease [2]. As a consequence, nursing professionals in particular have been affected by emotional disorders [3] and negative impacts on quality of life [4].

Among the various emotional disorders experienced by nursing team professionals, anxiety, depression, and stress have been found to be the most prevalent [5-7]. These conditions can adversely affect cognitive functions such as attention and memory, thereby increasing the risk of adverse events [8] and compromising patient safety [9].

In the specific context of COVID-19, heightened anxiety was observed, resulting in the occurrence of Post-Traumatic Stress Disorder (PTSD) in healthcare professionals who were working on the frontline of care during the pandemic [10,11]. These findings highlight the magnitude of the mental suffering experienced by these professionals.

In light of this, the need for institutional programs that provide mental health support to professionals during the COVID-19 pandemic has become evident [7]. Among the effective interventions to resolve or reduce these psycho-emotional disorders, Ear acupuncture (EA) has been cited as a promising approach [12,13].

EA, a technique stemming from Traditional Chinese Medicine (TCM), is based on the stimulation of auricular points that have a somatopsychic representation of the body; these points, through a neural network, conduct action potentials to the Central Nervous System (CNS) [14]. EA is a low-cost intervention applicable to occupational health in a variety of situations, including emergencies [15], such as that experienced in the context of the pandemic.

Previous studies have proven the effectiveness of EA for depression, anxiety, and stress [16,17] as well as its benefits for improving the quality of life of individuals receiving the technique [18-19]. However, there are still limitations related to the scarcity of clinical evidence established in studies with a high level of evidence and the difficulty in replicating the results due to the lack of standardized protocols. In addition, there are few studies investigating the use of EA as an intervention directed specifically to nursing professionals in a crisis context [17].

Faced with this scenario, the following question emerged: can EA improve the quality of life and emotional disorders of nursing professionals who have worked during the COVID-19 pandemic?

The objective of the present study was to evaluate the effectiveness of EA on quality of life and emotional disorders in nursing professionals who have worked in hospital settings during the COVID-19 pandemic. Our hypothesis is that EA can lead to significant improvements in quality of life and levels of anxiety, stress, depression, and Post-Traumatic Stress Disorder, when compared to a control group.

Materials and Methods

Study design

This is a randomized, controlled, parallel, open clinical trial, based on the guidelines of the Consolidated Standards of Reporting Trials (CONSORT) for its reporting [20].

Study population and eligibility criteria

This study was carried out in a public hospital in a city in Minas Gerais, Brazil, between January and September 2021.

The population of nursing professionals consisted of 786 individuals who were professionally active. Of these, 284 were interested in participating in the study. The screening criteria adopted were moderate, severe, or extremely severe levels of stress, anxiety, and/or depression, according to the DASS-21 scale [21]. The sample therefore consisted of 200 nursing professionals.

The inclusion criteria adopted were the following: nursing professionals working in the various hospital sectors; and availability to answer the questionnaires and scales, and to participate in the intervention and in all the meetings related to the intervention.

Participants with infection, inflammation, injury, or deformity of the pinna were excluded from the study [22]; as well as those wearing hearing aids; those with a history of allergy to metal or microporous tape [22,23]; pregnant women [23]; those who refused to receive the auricular treatment using needles [22]; those who had vacations scheduled during the period of treatment and evaluations [23]. It should be noted that professionals who were on medication were not excluded because, as EA is a complementary technique, it is worth evaluating its effect in real-life situations [24].

Participants were excluded from the study if they missed two consecutive sessions or exceeded the 15-day interval between sessions; were absent due to vacation, sick leave, or change of duty; asked to leave the institution during data collection; started any of the Complementary and Integrative Practices (CIPs) during the study period; had an infection, inflammation, injury, or intense

discomfort in the pinna due to the permanence of the needles.

Sample size and randomization

To estimate the sample size, a pre-test (n=30) was carried out using the variable "Perception of quality of life" from the Whoqol-Bref instrument [25], considered to be the primary outcome. The mean difference between the groups was 3.44 (sd=2.70) points in the initial assessment, and 11.74 (sd=2.60) points in the final assessment.

The software RMASS2®: Repeated Measures with Attrition: Sample Sizes for 2 Groups [26] was used to estimate the sample size. For a significance level of 5%, power of 90%, and average effect size (0.5), a sample of 86 individuals in each group was estimated. In order to prevent sample loss, this result was corrected by 15% [27], which increased the sample to 99 individuals per group. The study had a final sample of 179 participants, with a 10.5% loss of the initial sample.

The participants were randomly allocated into either the control group (CG), which did not receive EA, or the intervention group (IG), which received EA. The randomization was carried out by a researcher who had been masked to the study design, in a 1:1 ratio in 10 blocks of 20 numbers each, via the website http://www.randomizer.org/. Each number in the randomization sequence was placed in an opaque, sealed envelope, and was handed to the interventionist only during the first treatment session.

Intervention

In order to better establish an EA treatment protocol, the guidelines of the Standards for Reporting Interventions in Clinical Trials of Acupuncture (STRICTA) [28] were used, and the auricular points were determined based on previous studies [13,22] and on the clinical experience of two nurses specialized in acupuncture, with experience in EA.

The intervention consisted of five sessions, conducted once a week for five weeks, with the alternation of the ear pinna at each session [30], which lasted approximately 10 minutes. The intervention was carried out by a nurse with four years of clinical experience in EA.

The protocol was applied in the IG using semi-permanent, sterile, disposable surgical steel needles measuring 0.22 x 1.3 millimeters, manufactured by Blessfun®. The intervention was carried out in the hospital where the professionals worked, in an adequately prepared room with a washbasin for hand hygiene, chairs, a support table, a sharps collector, and a place to dispose of infectious and common waste. The interventionist wore specific clothing, goggles, an N95 mask, and used 70% ethyl alcohol to sanitize their hands before and after manipulating the ear. These precautions were adopted to avoid contamination and transmission of the coronavirus, as well as to prevent infection from ear manipulation.

The placement of the ear points was based on the Chinese map recommended by the World Federation of Acupuncture-Moxibustion Societies (WAFS) (2013) [31], and verified using the EL30 Finder NKL Basic® point locator.

The following auricular points were used: Shenmen, Kidney, Autonomic Nervous System, Heart, Brainstem, Liver and Liver Yang 2 [13], Lungs, and Spleen [29] (Figure 1). This was validated by four judges with experience in acupuncture.

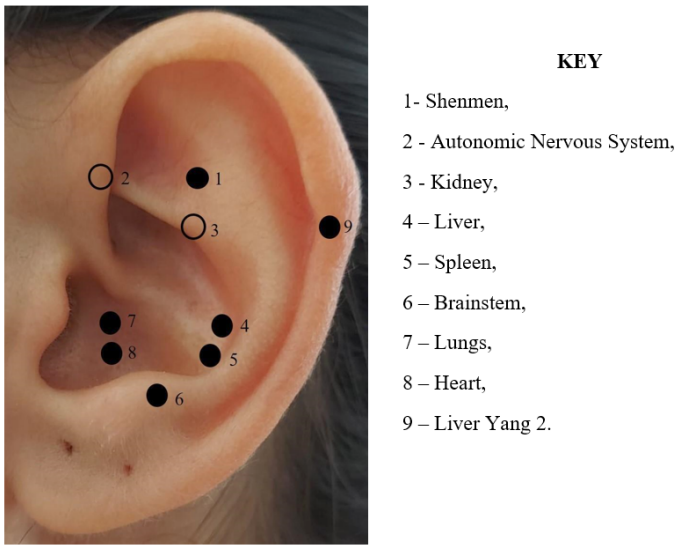

Figure 1: Auricular points.

Outcomes

The perception of quality of life, assessed using the Word Health Organization quality of life – bref (Whoqol-Bref) instrument, was considered the primary outcome. The secondary outcomes were satisfaction with health, the physical, psychological, social relations, and environmental domains of the Whoqol-Bref, and levels of stress, anxiety, and depression and post-traumatic stress.

The Whoqol-bref consists of 26 questions, the first of which refers to general quality of life (primary outcome), and the second to satisfaction with one's own health. The other 24 questions are divided into physical, psychological, social relations, and environmental domains (secondary outcome) [25]. It was developed by the World Health Organization (WHO) and consists of 26 items. The Portuguese version was developed by the WHOQOL Center for Brazil and has adequate validation and psychometric properties [25]. The score is listed from zero to 100, with zero being the worst level and 100 being the best possible level of quality of life [25]. The Cronbach's Alpha of this

instrument in the present study was 0.76 of the total score.

The DASS-21 was used to evaluate the levels of stress, anxiety, and depression. This scale is based on the tripartite model, in which the affective disorder is caused by continuous anxiety, depression, and stress [21]. The scale was created by Lovibond in 1995 to measure and differentiate, as far as possible, the symptoms of anxiety and depression in non-clinical subjects [32].

Each of the three subscales evaluates symptoms in the last week through seven questions, with four answers for each question (0=did not apply at all; 1=applied to some extent, or for a short time; 2=applied to a considerable extent, or for a considerable part of the time; 3=applied greatly, or most of the time). The sum of each subscale, multiplied by two, results in the final DASS-21 score [21]. It is a self-administered questionnaire and it has been translated and validated in Brazil by Vignola and Tucci [21]. For the present study, the internal consistency was also considered adequate [33], with a total Cronbach's alpha of 0.88, with 0.82 for the depression subscale, with 0.77 for the anxiety subscale, and with 0.74 for the stress subscale.

The Impact of Event Scale-Revised (IES-R), which has been validated and adapted for the Brazilian version, was used to assess PTSD symptoms [34]. In the present study, Cronbach's Alpha was 0.93 for the total score, which is considered an adequate value [34]. This scale is self-administered and contains 22 items subdivided into 3 symptom subscales, as follows: avoidance, intrusion, and hyperstimulation, where individuals answer the questions by recalling the last seven days. Each item comprises a statement and the individual presents their answer via possibilities distributed on a 5-level Likert scale, whose values vary from 0 to 4 points, where 0 means "Not at all" and 4 means "Extremely". The general result is the sum of the means found in each sub-scale. The cut-off point is 5.6, i.e., scoring above this value means the individual has PTSD [34].

The sociodemographic, occupational, and psychosocial variables of nursing professionals were also analyzed, as well as the individual and institutional characteristics that are related to anxiety, stress, and depression [17]. These are: age; sex; marital status; whether they have children; religion; professional category; monthly income; time working at the institution; lifestyle habits (sleep, alcohol use, smoking, social support); work shift; number of jobs; perception of their health and interpersonal relationship with the multi-professional team; work overload and insecurity; whether they use medication for stress, anxiety, or depression, and whether they have contracted COVID-19.

Data collection

The evaluations were carried out at three points: initial (before the randomization process), final (five weeks after the initial evaluation). In the IG, this evaluation was carried out after the needles had been removed (after the last session); and at follow-up,15 days after the end of treatment. All the instruments were self-administered.

Data analysis

The Statistical Package for the Social Sciences (SPSS), version 23.0, was used for the statistical analysis.

The sociodemographic and clinical variables were used to determine homogeneity between the IG and CG using the student's t-test and the Mann-Whitney test at a 5% significance level.

The continuous variables were compared using the Generalized Estimating Equations (GEE) test, to evaluate the effect of group allocation, adjusting for the effect of time and interaction (group*time). The variables were treated as Gamma distribution and logarithmic link function. Several covariance matrices were also evaluated (independent, AR (1), exchangeable, and unstructured), and the model with the lowest Quasi Likelihood Under Independence Model Criterion (QIC) and best fit was used. For significant effects at 5%, the Bonferroni-protected post-hoc t-test was used to compare the means.

Ethical aspects

Approval was granted by the Ethics Committee under opinion: 3.660.664/ CAAE: 85682518.0.0000.5149 and the study was registered on the Brazilian Clinical Trials Registry website (ReBEC) (RBR-2JNX4S).

The CG participants were invited, after the follow-up evaluation, to receive the same therapy offered to the IG.

Results

A total of 200 nursing professionals were included and randomized between CG and IG. The data of 21 participants (10.5%) were excluded from the statistical analysis because they withdrew from the treatment (n=7); went on vacation (n=5); left the hospital (n=4); had pain in the pinna (n=4), and were undergoing another energy practice (n=1) (Figure 2).

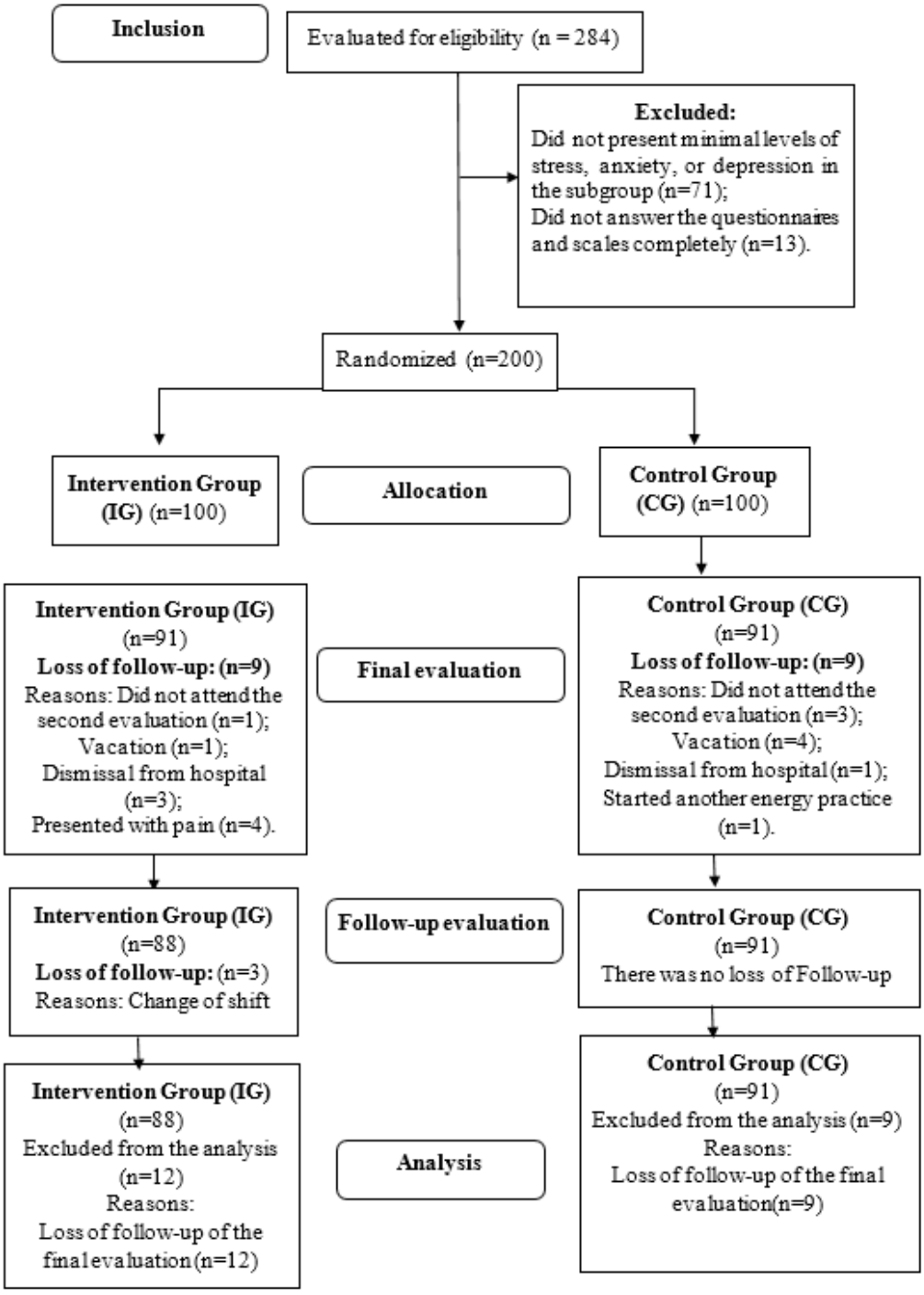

Figure 2: Flowchart of the sample's progress through the study stages.

Table 1 shows that the sociodemographic variables analyzed were homogeneous between the groups, which demonstrates the suitability of the randomization process.

SUBJECT IDENTIFICATION		IG (n=88)	CG (n=91)	p-value
Age (m±sd)	Years	35.42 (±8.43)	36.83 (±8.29)	0.259[1]
Sex f (%)	Female	81 (92.0)	85 (93.4)	0.726[2]
	Male	7 (8.0)	6 (6.6)	
Marital Status f (%)	Single	44 (50.0)	29 (31.9)	0.085[2]
	Married/stable union	32 (36.4)	48 (52.7)	
	Widowed	1 (1.1)	2 (2.2)	
	Divorced	11 (12.5)	12 (13.2)	
Children f (%)	Yes	44 (50.0)	58 (63.7)	0.063[2]
	No	44 (50.0)	33 (36.3)	
Religion f (%)	Atheist	-	1 (1.1)	0.583[2]
	Agnostic	13 (14.8)	18 (19.8)	
	Catholic	40 (45.5)	39 (42.9)	
	Spiritualist	4 (4.5)	1 (1.1)	
	Protestant	29 (33.0)	29 (31.9)	
	Other	2 (2.3)	3 (3.3)	
Professional category f (%)	Nursing Assistant	1 (1.1)	-	0.079[2]
	Nursing Technician	67 (76.1)	59 (64.8)	
	Nurse	1 (1.1)	7 (7.7)	
	Postgraduate in Nursing	19 (21.6)	25 (27.5)	
Monthly income (times the minimum wage)* f (%)	From one to one and a half	40 (45.5)	32 (35.2)	0.170[2]
	From two to three	39 (44.3)	40 (44.0)	
	From four to five	7 (8.0)	17 (18.7)	
	Six or more	2 (2.3)	2 (2.2)	

Note: m: mean; sd: standard deviation; f: absolute frequency; %: percentage.
Key: [1]*Student's t*; [2]Chi-Squared
*Minimum wage in effect in 2021: BRL 1,192.40.

Table 1: Sociodemographic characteristics of nursing professionals (n=179). Minas Gerais, 2021.

Table 2 also shows the homogeneity between the groups regarding the psychosocial and work-related characteristics of nursing professionals.

Psychosocial and work-related characteristics		IG (n=88)	CG(n=91)	p-value
Time working at the institution (Median and interquartile range)	Months	42 (11-56.50)	41 (24-86)	0.052[1]
Sleeps well f (%)	No	62 (70.5)	63 (69.2)	0.858[2]
	Yes	26 (29.5)	28 (30.8)	

Consumes alcoholic beverages f (%)	No	50 (56.8)	60 (65.9)	0.210[2]
	Yes	38 (43.2)	31 (34.1)	
Smoker f (%)	No	84 (95.5)	86 (94.5)	0.771[2]
	Yes	4 (4.5)	5 (5.5)	
Has good social support f (%)	No	19 (21.6)	21 (23.1)	0.811[2]
	Yes	69 (78.4)	70 (76.9)	
Work shift f (%)	Morning	11 (12.5)	20 (22.0)	0.226[2]
	Afternoon	10 (11.4)	5 (5.5)	
	Night	20 (22.7)	18 (19.8)	
	Full time	47 (53.4)	48 (52.7)	
Number of jobs f (%)	One	56 (63.6)	55 (60.4)	0.713[2]
	Two	30 (34.1)	35 (38.5)	
	Three or more	2 (2.3)	1 (1.1)	
Perception of their own health f (%)	Quite good	6 (6.8)	7 (7.7)	0.659[2]
	Good	44 (50.0)	47 (51.6)	
	Average	30 (34.1)	33 (36.3)	
	Bad	8 (9.1)	4 (4.4)	
	Quite bad	-	-	
Has a good relationship with colleagues f (%)	No	1 (1.1)	3 (3.3)	0.328[2]
	Yes	87 (98.9)	88 (96.7)	
Feels overloaded at work f (%)	No	21 (23.9)	16 (17.6)	0.300[2]
	Yes	67 (76.1)	75 (82.4)	
Feels insecure at work f (%)	No	56 (63.6)	54 (59.3)	0.555[2]
	Yes	32 (36.4)	37 (40.7)	
Taking medication for stress f (%)	No	81 (92.0)	80 (87.9)	0.358[2]
	Yes	7 (8.0)	11 (12.1)	
Taking medication for anxiety f (%)	No	59 (67.0)	67 (73.6)	0.335[2]
	Yes	29 (33.0)	24 (26.4)	
Taking medication for depression f (%)	No	71 (80.7)	72 (79.1)	0.795[2]
	Yes	17 (19.3)	19 (20.9)	
Has contracted COVID-19 f (%)	No	55 (62.5)	55 (60.4)	0.777[2]
	Yes	33 (37.5)	36 (39.6)	

Note: f: absolute frequency; %: percentage.
Key: [1]Mann-Whitney; [2]Chi-Squared Test.

Table 2: Psychosocial and work-related characteristics of nursing professionals (n=179). Minas Gerais, 2021.

Table 3 shows the differences in scores found between the groups in relation to quality of life after five weeks of starting the protocol and also during the follow-up period. In the domain of perceived quality of life (primary outcome), the IG scored higher than the CG. A statistically significant improvement was also noted in the IG over time, while the CG remained without statistically significant changes.

Variables	Groups	INTERGROUP ANALYSIS			INTRAGROUP ANALYSIS p-value (CI 95%†)		
		Initial m (sd)	Final m (sd)	Follow-up m (sd)	Initial-Final	Final-Follow-up	Initial - Follow-up
Perceived quality of life	**CG** (n=91)	57.22 (1.85)	58.15 (1.98)	57.50 (1.90)	1.000 (-5.55; 3.70)	1.000 (-4.22; 5.51)	1.000 (-4.65; 4.09)
	IG (n=88)	53.78 (1.95)	69.89 (1.66)	65.91 (1.98)	<0.001* (-21.37; -10.85)	0.68 (-0.20;8.16)	<0.001* (-17.28; -6.98)
	p-value	0.201	<0.001*	0.002*			
	95% CI†	-1.83;8.71‡	-16.80; -6.67‡	-13.78; -3.03‡			
Satisfaction with health	**CG** (n=91)	44.90 (2.03)	45.60 (2.01)	48.11 (2.00)	1.000 (-5.93; 4.55)	0.339 (-8.51;2.01)	0.444 (-8.51; 2.10)
	IG (n=88)	46.21 (2.20)	62.50 (2.09)	57.55 (2.18)	<0.001* (-21.84 -10.75)	0.018* (0.63;9.27)	<0.001* (-16.52; -6.15)
	p-value	0.660	<0.001*	<0.001*			
	95% CI†	-7.17;4.54‡	-22.58; -11.23‡	-15.23; -3.65‡			
Physical domain	**CG** (n=91)	51.84 (1.35)	53.65 (1.25)	52.67 (1.31)	0.283 (-4.38;0.78)	1.000 (-1.60;3.56)	1.000 (-3.50;1.85)
	IG (n=88)	53.70 (1.54)	70.94 (1.35)	65.90 (1.48)	<0.001* (-21.18;13.32)	<0.001* (1.92;8.14)	<0.001* (-16.15; -8.23)
	p-value	0.366	<0.001*	<0.001*			
	95% CI†	-5.86;2.16‡	-20.89; -13.69‡	-17.11; -9.37‡			
Psychological domain	**CG** (n=91)	47.07(1.42)	48.68(1.43)	48.63(1.53)	0.347 (-4.04;0.84)	1.000 (-2.39;2.48)	0.445 (-4.13;1.02)
	IG (n=88)	48.15(1.59)	65.15(1.38)	59.95(1.65)	<0.001* (-20.66; -13.34)	<0.001* (2.43;7.99)	<0.001* (-15.77; -7;81)
	p-value	0.611	<0.001*	<0.001*			
	95% CI†	-5.26;3.09‡	-20.38;12.57‡	-15.72; -6.91			
Social relations domain	**CG** (n=91)	52.38 (1.88)	57.02 (1.85)	53.20 (2.07)	0.005* (-8.20; -1.08)	0.74 (-0.25;7.88)	1.000 (-4.63;2.98)
	IG (n=88)	53.16 (1.97)	65.34 (1.88)	60.41 (2.03)	<0.001* (-17.01; -7.35)	0.003* (1.33;8.52)	0.002* (-12.28;2.23)
	p-value	0.775	0.002*	0.013*			
	95% CI†	-6.12;4.56‡	-13.48;3.15‡	-12.90; -1.52‡			

Environment domain	**CG** (n=91)	48.56 (1.37)	51.31 (1.41)	50.65 (1.37)	0.014* (-5.45; -0.45)	1.000 (-1.57;3.29)	0.150 (-4.65;0.46)
	IG (n=88)	48.08 (1.33)	59.83 (1.21)	57.17 (1.25)	<0.001* (-14.87; -8.63)	0.027* (0.22;5.10)	<0.001* (-12.47; -5.71)
	p-value	0.803	<0.001*	<0.001*			
	95% CI†	-3.27;4.22‡	-11.99;4.67‡	-10.16; -2.88‡			

Note: CG: control group; IG: intervention group.
m: mean; sd: standard deviation.
†Confidence interval for the difference in means at 95%.
*p < 0.05 according to the Generalized Estimating Equations model.
‡Difference in means: CG – IG.

Table 3: Intergroup and intragroup analysis of the Quality of Life domains in nursing professionals (n=172). Minas Gerais, 2021.

In the satisfaction with health, physical, psychological, social relations, and environment domains (secondary outcomes), the IG score was statistically higher when compared to the CG in the final and follow-up evaluations. The IG also scored higher between the start and end of treatment, and between the start and follow-up, however, there was a significant reduction in all these variables between the end and follow-up periods. The CG presented no statistically significant changes during the intragroup analysis.

The levels of stress, anxiety, and depression presented statistically significant reductions in the IG when compared to the CG. Regarding stress, in the final assessment, the IG presented a normal level, while the CG maintained a severe level. In the follow-up comparison, the IG presented a low level, while the CG presented no changes (Table 4).

Regarding the level of anxiety, there was also a statistically significant improvement in the IG compared to the CG. The IG presented a normal level, while the CG remained at a severe level. In the follow-up assessment, the IG presented a moderate level of anxiety, while the CG remained at the severe level (Table 4).

The analysis of depression presented a normal level in the final assessment in the IG and a moderate level in the CG. In the follow-up assessment, the CG remained at a moderate level, while the IG presented a low level of depression (Table 4).

Emotional disorder	**Groups**	**INTERGROUP ANALYSIS**			**INTRAGROUP ANALYSIS p-value (95% CI†)**		
		Initial m (sd)	**Final** m (sd)	**Follow-up** m (sd)	**Initial-Final**	**Final-Follow-up**	**Initial - Follow-up**
Stress	**CG** (n=91)	28.29 (0.80)	26.84 (0.88)	26.15 (0.87)	0.307 (-0.68;3.58)	1.000 (-1.23; 2.59)	0.052 (-0.01;4.28)
	IG (n=88)	27.23 (0.77)	12.23 (0.69)	17.30 (1.10)	<0.001* (12.82;17.17)	<0.001* (-7.37; -2.77)	<0.001* (7.07;12.78)
	p-value	0.341	<0.001*	<0.001*			
	95% CI†	-1.12;3.24‡	12.41;16.80‡	6.09;11.61‡			
Anxiety	**CG** (n=91)	19.52 (0.96)	18.23 (1.01)	18.70 (0.98)	0.671 (-1.25; 3.83)	1.000 (-2.67; 1.73)	1.000 (-1.45; 3.09)
	IG (n=88)	18.95 (0.95)	7.58 (0.71)	12.14 (1.16)	<0.001* (8.79; 13.96)	<0.001* (-7.01; -2.12)	<0.001* (3.69; 9.94)
	p-value	0.675	<0.001*	<0.001*			
	95% CI†	-2.09; 3.23‡	8.24; 13.07‡	3.56; 9.57‡			

Depression	**CG** (n=91)	20.55 (1.02)	18.77 (1.11)	18.44 (1.05)	0.225 (-0.61; 4.17)	1.000 (-1.64; 2.29)	0.073 (-0.13; 4.34)
	IG (n=88)	18.83 (0.99)	8.21 (0.75)	12.28 (1.14)	<0.001* (8.07; 13.17)	<0.001* (-6.36; -1.79)	<0.001* (3.36; 9.73)
	p-value	0.277	<0.001*	<0.001*			
	95% CI†	-1.07; 4.51‡	7.93; 13.19‡	3.12; 9.21‡			

Note: CG: control group; IG: intervention group.
m: mean; sd: standard deviation.
†Confidence interval for the difference in means at 95%.
*p < 0.05 according to the Generalized Estimating Equations model.
‡Difference in means: CG – IG.

Table 4: Intergroup and intragroup analysis of levels of stress, anxiety, and depression in nursing professionals (n=172). Minas Gerais, 2021.

In the analyses carried out over time, the IG presented statistically significant reductions in the comparisons between the initial and final evaluations and in the comparisons between the initial and follow-up evaluations. In the comparisons between the final and follow-up assessments, all the variables presented statistically significant increases. The CG presented no statistically significant changes over time.

A statistically significant difference in PTSD was also found in the IG in the final and follow-up evaluations compared to the CG. The IG presented a lower level, without the disorder, when compared to the CG in the final evaluation. At follow-up, the CG once again presented levels that characterized the disorder, while the IG remained free of it (Table 5). In the analysis over time, both groups presented a statistically significant increase between the initial and final evaluations. However, the IG presented a statistically significant reduction when comparing the initial and follow-up evaluations, while the CG remained without significant changes. The IG presented no symptoms of PTSD after treatment, while the CG still presented the disorder.

PTSD	**INTERGROUP ANALYSIS**			**INTRAGROUP ANALYSIS p-value (95% CI†)**		
	Initial m (sd)	**Final** m (sd)	**Follow-up** m (sd)	**Initial-Final**	**Final-Follow-up**	**Initial - Follow-up**
CG (n=91)	6.31 (0.26)	5.58 (0.25)	5.87 (0.27)	0.003* (0.19;1.25)	0.435 (-0.77;0.19)	0.148 (-0.09;0.96)
IG (n=88)	6.67 (0.24)	3.59 (0.26)	3.83 (0.29)	<0.001* (2.43;3.73)	0.975 (-0.82;0.34)	<0.001* (2.14;3.54)
p-value	0.303	<0.001*	<0.001*			
95% CI†	-1.06;0.33‡	1.29;2.69‡	1.28;2.81‡			

Note: CG: control group; IG: intervention group.
m: mean; sd: standard deviation.
†Confidence interval for the difference in means at 95%.
*p < 0.05 according to the Generalized Estimating Equations model.
‡Difference in means: CG – IG.

Table 5: Intergroup and intragroup analysis of post-traumatic stress disorder (PTSD) in nursing professionals (n=172). Minas Gerais, 2021.

Discussion

The results of the present study have shown that EA is a favorable therapeutic option for improving quality of life and treating emotional disorders in nursing professionals who have worked during the COVID-19 pandemic. Participants who received the intervention presented significant improvements in quality of life, satisfaction with their health and in several mental health indicators, including levels of stress, anxiety, depression, and post-traumatic stress disorder.

These findings are consistent with other studies that have also found positive results in improving quality of life [18,19], and in reducing levels of stress, anxiety, and depression [16,17,35,36] in nursing professionals as well as in other populations. It should also be noted that, to date, no studies evaluating the effect of EA on Post-Traumatic Stress Disorder in nursing professionals who worked during the COVID-19 pandemic have been found.

EA is a technique that stimulates specific points in the ear, based on TCM theory, to promote body balance and the release of endorphins and enkephalins, which are associated with emotional well-being [37]. In addition, studies have shown the specificity and neurophysiological mechanism of action of EA [38,39], and magnetic resonance imaging has detected signs of activation of limbic cortical regions related to pain and emotions after auricular stimulation [35].

The results of this study are relevant, as they highlight the importance of implementing actions that support psychological and emotional management, especially during infectious pandemics such as COVID-19, which can negatively affect people's quality of life.

In terms of specific results, EA showed a statistically significant improvement in the physical, psychological, social, and environmental domains of quality of life, as well as in symptoms of stress, anxiety, depression, and post-traumatic stress disorder.

In fact, in the present study a statistically significant difference of 11.74 and 16.9 points was found between the groups in terms of perceived quality of life and satisfaction with health, respectively, showing that the protocol adopted is effective in terms of quality of life and can be applied in nursing professionals in situations of psychological and emotional vulnerability. Corroborating these findings, a study aiming to evaluate the quality of life before and after the application of EA and the satisfaction of university students with the treatment during the COVID-19 pandemic found that the intervention was able to improve quality of life, and the level of satisfaction with the treatment was high [40].

In the physical domain, other studies have shown that EA can improve pain [41]; sleep [18]; dependence on medication [42]; and work capacity [19], which are some of the factors that comprise this facet of the Whoqol-bref. However, studies with nursing team personnel in a crisis context are scarce, which highlights the importance of this study. In fact, the physical domain evaluated in this study showed a statistically significant difference of 17.29 points between the groups, in which the group that received the intervention scored higher. These results may be related to pain relief, for instance, which is common in this professional category [43], and the restoration of the conditions that compose the physical domain of quality of life.

The present study also showed the effectiveness of EA in the psychological domain of quality of life, which encompasses aspects such as positive and negative feelings; self-esteem; spirituality/religion/personal beliefs, among others [25]. A statistically significant difference of 16.47 points was found between the groups, with the group receiving the therapy scoring higher. This finding corroborates a study carried out with the same population, which showed a significant improvement of approximately five points in the mental domain in the group that received EA compared to the group that did not receive the intervention [37]. In fact, the protocols adopted in both studies are similar. Kurebayashi and Silva [37] used the following acupoints: shenmen, brainstem, kidney, liver yang 2, the first two of which are recommended for managing psychological and emotional disorders, which helped to reduce symptoms of anxiety, stress, and other associated psychological symptoms [37,43]. The Kidney point promotes the preservation of health, benefiting brain function [35] and Liver Yang 2 is used for excess patterns, as in the case of stress [13].

The social relations of nursing professionals have also been damaged by the outbreak of the COVID-19 pandemic [17], due to the restrictive measures and social distancing imposed [44]. From this perspective, this study showed the relevance of EA as an effective intervention in managing the social relations of nursing professionals. The results show that the group that received EA scored higher than the control group, with a statistically significant difference of 8.32 points. This finding may be related to the possible creation of a bond between participant and therapist [35], which can be characterized as social support.

Regarding the environment domain, there was a statistically significant difference of 8.52 points between the groups, in which those who received EA scored higher than the control group. The facets that compose this domain evaluate physical safety and protection; household environment; financial resources; availability and quality of health and social care; opportunities to obtain new information and skills; participation and opportunities for recreation/leisure; physical environment (pollution/noise/traffic/climate) and transportation [25]. These aspects of the environmental domain cannot be changed from an internal, individual perspective, as they are subject to the collective and to society. Therefore, when an improvement in the score for this

domain is seen, it is believed that EA can modulate feelings of boredom and pessimism, which favors individuals' willingness to adopt a more positive perspective on the aspects that surround them [16].

Stress, anxiety, and depression can also interfere with the quality of life of nursing professionals, especially in the pandemic context [45]. However, there are few studies evaluating associated stress, anxiety, and depression in nursing professionals undergoing EA treatment. Nevertheless, the effectiveness of the technique in reducing anxiety and stress has already been demonstrated in healthcare professionals, through the use of the Shenmen, Brainstem, Kidney, Sympathetic (or Autonomic Nervous System), Lung, and Liver acupoints [35]; and also, in the adult and elderly population in varying health conditions, through the Shenmen, Kidney, Autonomic Nervous System, Heart, Brainstem and Liver 1 and 2 acupoints [13]. It should be noted that all these acupoints, along with the Spleen and Heart acupoints, were used in the present study.

Regarding stress, the group that received the intervention showed a significant improvement (14.61 points) compared to the control group, in addition to changing the level from severe to normal after the treatment. These results corroborate a clinical trial carried out with 168 nurses working at a hospital [43]. They were randomized into three groups, namely: true ear acupuncture, placebo ear acupuncture, and control (no intervention). There was a statistically significant difference of 27.4 points in the true technique group compared to the control group, after 12 treatment sessions over six weeks [43]. It is noteworthy that, with the smallest number of sessions, it was already possible to notice beneficial effects on the symptoms of stress in nursing professionals.

Regarding the choice of auricular acupoints, the present study and that of Prado [43] used the Shenmen and Brainstem. In this sense, the importance of applying these acupoints in the management of stress symptoms can be highlighted, since both have calming properties and are clinically relevant in the treatment of problems of a mental and emotional nature [43].

Regarding anxiety, this study found a statistically significant difference of 10.65 points between the groups at the end of treatment, in favor of the IG. In addition, a statistically significant reduction of 60% was found in the time analysis. A similar result was found in a clinical trial carried out with 133 nursing professionals who were allocated into four groups, namely: control (no intervention), ear acupuncture with seeds, ear acupuncture with semi-permanent needles, and ear acupuncture with adhesive tape (placebo) [23]. It was found that the therapy carried out in 10 sessions, twice a week, with semi-permanent needles, reduced the state of anxiety of the professionals who received EA by 3.8 points when compared to the control group, in addition to a 17% reduction over time [23].

The aforementioned study used a protocol with five ear acupoints [23], while in the present study nine were used, with only two acupoints similar to each other: the Shenmen and the autonomic (or sympathetic) system. The choice of the Kidney and Heart acupoints in this more comprehensive protocol may be related to the increased reduction of anxiety symptoms, since they promote relaxation and emotional relief [12] and the Kidney acupoint also provides benefits for brain function [35].

Regarding depressive symptoms, this study found a statistically significant difference of 10.56 points between the groups after the five EA sessions had been carried out and, in the time analysis, there was a significant reduction of 56.4% after the treatment. On the other hand, a clinical trial with 105 nursing professionals randomized into two groups (those who received the intervention and those who did not) showed no statistically significant difference between the groups, not even over time [36].

Again, the difference in the protocols used may be one of the factors that led to the more comprehensive effect. While we used nine auricular acupoints and semi-permanent needles, the study in comparison used only three acupoints (Shenmen, Brainstem, and Kidney), with the use of radionic crystals [36].

The three acupoints chosen by Silva [36] were also used in this protocol; however, the specificity of the Heart acupoint may have influenced the superiority of the effect found in the present study. This acupoint can improve levels of depression by balancing the Shen, which represents consciousness and is responsible for emotions [46]. However, it is worth noting that each human being is unique and can react differently to the same influences from their environment. Likewise, energy imbalance is personal and, therefore, the response to the auricular stimuli provided by EA will also be individual.

It is worth noting, however, that the variation in auricular protocols can be based on pathophysiological knowledge, which tends to bring Western and Eastern reasoning closer together, and also considers the researchers' perception of the phenomenon in question [23].

The literature indicates that EA is a practice adopted to improve emotional symptoms in disaster situations [47], such as in the context of the COVID-19 pandemic, which includes post-traumatic stress disorder (PTSD). However, it is worth noting that the studies conducted to date have been carried out with the general population, such as survivors of natural disasters [48].

The present study highlights the benefits of the technique in nursing professionals, since it achieved a reduction of 3.08 points on the IES-R scale, which was statistically significant, in the context of the COVID-19 pandemic. A study [49] also presented positive results in relation to PTSD in healthcare professionals,

using ear acupressure with seeds, concluding that this intervention is a safe, effective, and practical strategy for reducing the levels of this disorder [47].

The technique's mechanisms of action in cases of PTSD have not been clarified in the literature. However, acupuncture, of which EA is a branch, has made it possible to observe, through animal experimentation, results that may explain the findings of the present study. The therapeutic effect of acupuncture may be related to the regulation of stress responses in the neuroendocrine system and synaptic flexibility in several brain areas, especially the hippocampus, which reduces anxiety and fear responses and improves sleep structure, which is typical of PTSD [50].

In light of the findings of the present study, the effectiveness of EA in promoting the mental health of nursing professionals in the context of the pandemic is noteworthy. These results are innovative and emphasize the benefits of EA on quality of life and on the treatment of emotional disorders in this population.

However, it is worth noting that the study has some limitations, such as the fact that it was not possible to blind the participants due to the nature of the intervention. In addition, the study was conducted in a single institution, which may limit the generalizability of the results. Therefore, it is suggested to carry out multicenter studies with nursing professionals from different institutional contexts in order to validate the results found.

Conclusions

EA has been found to be effective in improving quality of life and reducing symptoms of stress, anxiety, depression, and post-traumatic stress disorder in nursing professionals during the COVID-19 pandemic. These results suggest that EA can be an important therapeutic option for providing care for the mental and emotional health of these professionals, especially in crisis contexts.

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Ethical Considerations

Approval was granted by the Ethics Committee under opinion: 3.660.664/ CAAE: 85682518.0.0000.5149

Conflict Of Interest

The authors declare that they have no conflict interests.

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