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Effect of Music Therapy and Sound Isolation on the Comfort of Mechanically Ventilated Patients

Mekanik Ventilasyon Desteğinde Olan Hastalarda Müzik Terapi ve Ses İzolasyonunun Konfora Etkisi

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ABSTRACT *Objective:* This study was conducted experimentally to examine the effect of music therapy and sound isolation on the comfort of mechanically ventilated patients.
Materials and Methods: The study was conducted in the anesthesiology and reanimation intensive care unit of a university hospital between November 2019 and January 2020. Three different interventions were applied to n=24 patients who constituted the research sample. Each patient listened to Western Classical Music and Nihavend magam Turkish Classical Music separately for 60 minutes (min) and received an intervention of sound isolation for 60 min through a special headset.
Results: The mean age of the patients participating in the study was 64.88±14.05. Of the patients, 66.7% were male, 79.2% were married, and 45.8% were illiterate. Patients' systolic and diastolic blood pressures, pulse rate, respiratory rate, Critical-Care Pain Observation Tool score, and scores on agitation and anxiety sub-dimensions of the American Association of Critical Care Nurses Sedation Assessment scale were influenced by Western Classical Music, Nihavend maqam Turkish Classical Music, and sound isolation. No difference was found among the three different implementation interventions.
Conclusion: Music therapy and sound isolation interventions administered to mechanically ventilated patients positively affected the hemodynamic parameters of the patients and reduced the severity of pain perceived by the patients and the need for sedation. In this context, the most important finding of the study was that an intervention that eliminates noise in the intensive care environment for mechanically ventilated patients increases the comfort level of the patients. Another important and critical result of this research was that music therapy also acts as an intervention without noise stimuli.
Keywords: Mechanical ventilation, music therapy, sound isolation, patient comfort

ÖZ *Amaç:* Mekanik ventilasyon desteği uygulanan hastalarda müzik terapi ve ses izolasyonunun konfora olan etkisini incelemek amacıyla deneysel olarak yapılmıştır.
Gereç ve Yöntem: Araştırma, Kasım 2019-Ocak 2020 tarihleri arasında bir üniversite hastanesinin anesteziyoloji ve reanimasyon yoğun bakım ünitesinde yürütülmüştür. Araştırmanın örneklemini oluşturan n=24 hastaya üç farklı girişim uygulanmıştır. Her bir hastaya Klasik Batı Müziği ve Nihavent makamında olan Klasik Türk Müziği hastalara ayrı ayrı 60 dakika (dk) boyunca dinlettirilmiş ve özel bir kulaklık aracılığıyla 60 dk boyunca hastalara ses izolasyonu uygulanmıştır.
Bulgular: Araştırmaya katılan hastaların yaş ortalaması 64,88±14,05, %66,7'sinin erkek, %79,2'sinin evli, %45,8'inin okur-yazar olmadığı saptanmıştır. Hastaların sistolik, diyastolik kan basıncı, nabız hızı, solunum hızı, Yoğun Bakım Ağrı Gözlem Aracı puanları ve Amerikan Yoğun Bakım Hemşireleri Birliği Sedasyon Değerlendirme ölçeği ajitasyon ve anksiyete alt boyutu puanları Klasik Batı Müziği, nihavent makamında olan Klasik Türk Müziği ve ses izolasyonu doğrultusunda etkilemiştir. Araştırmada uygulanan Klasik Batı müziği, nihavent makamında Klasik Türk müziği ve ses izolasyonu uygulamaları arasında fark saptanmamıştır.
Sonuç: Mekanik ventilasyon desteğinde olan hastalara uygulanan müzik terapi ve ses izolasyonunun hastaların hemodinamik parametrelerini olumlu yönde etkilediği, hastaların algıladığı ağrı şiddetini ve sedasyon ihtiyacını azalttığı saptanmıştır. Bu bağlamda; çalışmanın en önemli bulgusu mekanik ventilasyon desteğinde olan hastalarda yoğun bakım ortamına ilişkin seslerin arındırıldığı bir girişimin hastaların konfor düzeyini artırdığıdır. Dolayısıyla müzik terapinin de sese bağlı uyaranlardan arındırılmış bir girişim olarak belki de etki ettiği de diğer araştırmanın önemli ve kritik bir sonucudur.
Anahtar Kelimeler: Mekanik ventilasyon, müzik terapi, ses izolasyonu, hasta konforu

Introduction

Comprehensive medical treatments and nursing care are provided by supporting life-threatened individuals, complex medical devices are included, and the care-treatment process of patients is carried out with a team approach in intensive care units (1). Mechanical ventilation is an intervention to support patients in intensive care units to maintain breathing, ensure lung expansion, and facilitate anesthesia and sedation (2-4). However, in mechanically ventilated patients, many physiological and psychological problems that disrupt comfort, such as insomnia, agitation, pain, sensory overload, physical inactivity, noise, loneliness, weakness, and sensory deprivation emerge (5,6). Previous studies showed that pain, insomnia, endotracheal intubation and mechanical ventilation interventions, medication applications, medical device alarms, noises during care activities, phone sounds, and noise due to alarms reduce the comfort level and pain tolerance of the patients and increase anxiety (7-14).

Today, besides modern medicine, the use of complementary and integrative care therapies has increased considerably all over the world (15-19). The National Center for Complementary and Integrative Health has defined complementary and integrative treatment methods in four large groups. The most important and most frequently used application of mind-body medicine is music (20). The World Federation of Music Therapy defines music therapy as the design and use of music and/or musical elements by a trained music therapist to improve and increase a person's quality of life or maintain it at a good level (21). Music therapy, one of the complementary and integrative treatment methods used for years, is used in intensive care, surgery, psychiatry, obstetrics, pediatrics, oncology, and radiotherapy/chemotherapy process (22-28). It is also frequently used for the treatment of pain, anxiety, and insomnia which are among the symptoms that occur in other interventional diagnosis-treatment processes such as mechanical ventilation (29-33). Moreover, studies revealed that it has positive effects such as activating the immune system, increasing comfort, and decreasing the length of hospital stay (34,35).

All relevant studies revealed that the noise that negatively affects the comfort level of mechanically ventilated patients should be eliminated. Since music therapy, which is one of the complementary and integrative treatment methods, can be used in the management of many symptoms such as anxiety, pain, and sedation, it can be used as an active multi-perspective nursing intervention by nurses. There are many international and national research results on the effect of different types of music on hemodynamic values, anxiety, pain, agitation stress, and comfort levels of mechanically ventilated patients and these results showed the positive effects of music. However, there is only one international study on sound isolation (2). This study will elucidate whether the music therapy administered to mechanically ventilated patients is effective as a result of the elimination of the noise arising from various sounds in the intensive care environment or due to its mechanism of action by applying the intervention of effective sound isolation. This research was carried out experimentally to examine the effect of music therapy and sound isolation on the comfort of mechanically ventilated patients.

Materials and Methods

An experimental research design with repeated measures was used. The study was conducted in the intensive care unit of a university hospital in İzmir. The sample size of the research was n=24 patients. Those who met the inclusion criteria between November 2019 and January 2020 constituted the sample. The inclusion criteria were as follows: being in the adult age group (18-85), no history of psychiatric or neurological disease diagnosis, having hemodynamic stability, no known hearing problems, having the same mechanical ventilator mode (spontaneous breathing is preserved during mechanical ventilation), having a Glasgow coma scale score of 9 and above, hospitalization at the anesthesiology and reanimation unit, having pain according to the "Critical-Care Pain Observation Tool (CPOT)", and being in need of sedation treatment according to the "American Association of Critical Care Nurses Sedation Assessment scale (AACNSAS)". The data were collected using the Patient Information Form consisting of 8 questions on descriptive and clinical characteristics, the Glasgow coma scale, the patient follow-up form in which patients' hemodynamic parameters at the 0^{th}, 30^{th}, and 60^{th} minutes after the application and CPOT and AACNSAS scores were recorded, the CPOT, and AACNSAS. In the study, the patients were selected in accordance with the sampling criteria and each patient was included in the experimental and control groups. Each intervention group includes 24 patients. Then, written consent was obtained from the patients' relatives. Pain and anxiety experienced by the patients were evaluated and the relevant scale scores were determined. Research interventions were administered to the patients who met

the criteria of the study for one day. Through an MP4 player and earphones, each patient listened to the music of which the characteristics were determined by a music and rhythm specialist: Western Classical Music composed by Johann Sebastian Bach who is one of the pioneers of Baroque music, and Nihavend maqam Turkish Classical Music at 17-18 sound level. Sound isolation was applied through a special headphone. The order of the interventions to be applied to the patients was determined by randomization and each intervention was administered for 60 minutes in the determined order. The Patient Information Form was filled before the interventions. The patient follow-up form, CPOT, and AACNSAS were completed before starting each intervention (0^{th} minute). Then, the patients received music and sound isolation interventions in the determined order. Hemodynamic values and scale scores of the patients were recorded at the 0^{th} minute before the music therapy and sound isolation interventions, at the 30^{th} minute of the intervention, and at the 60^{th} minute after the interventions were completed.

Statistical Analysis

The research data were analyzed using the SPSS (Statistical Package for Social Sciences for Windows) 25.0 program. Descriptive statistical methods (number, percentage, mean, standard deviation) were used for the evaluation of the data.

For the analysis, the mean systolic and diastolic blood pressure, pulse rate, respiratory rate, oxygen saturation, expiratory minute volume values, and CPOT and AACNSAS scores obtained as a result of music therapy and sound isolation interventions were calculated. Parametric tests were used in the statistical evaluations of the data. Analysis of variance was used in repeated measures for comparing more than two dependent groups and One-Way analysis of variance was used for comparing more than two independent groups. The Bonferroni pairwise comparison test was used to find the group creating the difference and was performed between 0^{th} and 30^{th} minutes, 0^{th} and 60^{th} minutes, and 30^{th} and 60^{th} minutes. Correlation analysis was used to test the correlation between continuous variables. The statistical significance was taken $p<0.05$ in the confidence interval of 95%.

As a result of the analysis, $\alpha=0.05$, the effect size was found to be 1,226 after the study, and after the study applied to 24 people, it was concluded that the power of the study was 0.999 with the post-hoc study.

Ethical and Research Approvals

The ethics approval of the study was approved by the Clinical Research Ethics Committee of Manisa Celal Bayar University Faculty of Medicine (decision no: 49, date: 07.10.2019). The research was carried out after written permission was obtained from the clinic where the study was conducted. After the first interview held with the researchers, the patients' relatives were informed and their verbal and written consent was taken.

Results

Sample Characteristics

The mean age of the 24 patients participating in the study was 64.88±14.05. Of the patients, 66.7% were male, 79.2% were married and 45.8% were illiterate. The disease history of the patients participating in the study was examined. Accordingly, the most common disease was chronic obstructive pulmonary disease by 12.5%. The mean duration of mechanical ventilation support was 18.79±20.64 days; the mean length of stay in the intensive care unit was 18.87±20.57 days; the mean Glasgow coma scale score was 10.20±1.38 (Table 1).

Effect of Music Therapy and Sound Isolation

As a result of the comparison of systolic blood pressure of the 24 patients participating in the study according to the intervention types and time, there was a statistically significant difference in the systolic blood pressure in terms of all three intervention types ($F_{\text{Western Classical Music}}$ =19.709 p=0.000*, $F_{\text{Turkish Classical Music}}$ =34.945 p=0.000*, $F_{\text{Sound Isolation}}$ =49.979 p=0.000*) ($p<0.05$) but no statistically significant difference was found between the intervention types ($F_{0th\ min}$ =0.297 p=0.744, $F_{30th\ min}$ =0.138 p=0.871, $F_{60th\ min}$ =0.502 p=0.607) ($p>0.05$) (Table 2).

As a result of the comparison of diastolic blood pressure of the patients participating in the study according to the intervention types and time, there was a statistically significant difference in the diastolic blood pressure in terms of all three intervention types ($F_{\text{Western Classical Music}}$ =11.289 p=0.000*, $F_{\text{Turkish Classical Music}}$ =13.194 p=0.000*, $F_{\text{Sound Isolation}}$ =19.448 p=0.000*) ($p<0.05$) but no statistically significant difference was found between the intervention types ($F_{0th\ min}$ =0.091 p=0.914, $F_{30th\ min}$ =0.043 p=0.958, $F_{60th\ min}$ =0.914 p=0.859) ($p>0.05$) (Table 2).

Table 1. Distribution of patients according to descriptive and clinical characteristics

		n=24	%
Age ($\bar{x}$ ± SD, 64.88±14.05)	69 years and below	13	54.2
	70 years and above	11	45.8
Gender	Female	8	33.3
	Male	16	66.7
Educational status	Illiterate	11	45.8
	Primary school	8	33.3
	Secondary school and above	5	20.9
Marital status	Married	19	79.2
	Single/widowed	5	20.8
Duration of mechanical ventilation support ($\bar{x}$ ± SD, 18.79±20.64)	1-10 days	9	37.5
	11-20 days	7	29.2
	21 days and above	8	33.3
Length of stay in the intensive care unit ($\bar{x}$ ± SD, 18.87±20.57)	1-10 days	9	37.5
	11-20 days	7	29.2
	21 days and above	8	33.3
Glasgow coma scale score ($\bar{x}$ ± SD, 10.20±1.38)			
Total		**24**	**100.0**

SD: Standard deviation

As a result of the comparison of pulse rate of the patients participating in the study according to the intervention types and time, there was a statistically significant difference in pulse rate in terms of all three intervention types ($F_{\text{Western Classical Music}}$ =19.785 p=0.000*, $F_{\text{Turkish Classical Music}}$ =31.722 p=0.000*, $F_{\text{Sound Isolation}}$ =41.979 p=0.000*) (p<0.05) but no statistically significant difference was found between the intervention types ($F_{\text{0th min}}$ =0.005 p=0.995, $F_{\text{30th min}}$ =0.016 p=0.984, $F_{\text{60th min}}$ =0.044 p=0.957) (p>0.05) (Table 2).

As a result of the comparison of respiratory rate of the patients participating in the study according to the intervention types and time, there was a statistically significant difference in respiratory rate in terms of all three intervention types ($F_{\text{Western Classical Music}}$ =24.863 p=0.000*, $F_{\text{Turkish Classical Music}}$ =14.134 p=0.000*, $F_{\text{Sound Isolation}}$ =14.511 p=0.000*) (p<0.05) but no statistically significant difference was found between the intervention types ($F_{\text{0th min}}$ =0.317 p=0.729, $F_{\text{30th min}}$ =0.508 p=0.604, $F_{\text{60th min}}$ =0.203 p=0.817) (p>0.05) (Table 2).

As a result of the comparison of oxygen saturation values of the patients participating in the study according to the intervention types and time, there was no statistically significant difference between the Western Classical Music and sound isolation interventions in terms of oxygen saturation values by time ($F_{\text{Western Classical Music}}$ =1.302 p=0.282*, $F_{\text{Sound Isolation}}$ =0.418 p=0.661*) (p<0.05). A statistically significant difference was found in respiratory rates depending on time in the Turkish Classical Music intervention ($F_{\text{Western Classical Music}}$ =3.671 p=0.033*) (p<0.05) but there was no statistically significant difference between the intervention types ($F_{\text{0th min}}$ =0.044 p=0.957, $F_{\text{30th min}}$ =0.049 p=0.952, $F_{\text{60th min}}$ =0.256 p=0.775) (p>0.05) (Table 2).

As a result of the comparison of expiratory minute volume of the patients participating in the study according to the intervention types and time, there was no statistically significant difference expiratory minute volume by time in the Turkish Classical Music intervention ($F_{\text{Turkish Classical Music}}$ =3.642 p=0.056) (p>0.05). A statistically significant difference was found in expiratory minute volume depending on time in the Western Classical Music and sound isolation interventions ($F_{\text{Western Classical Music}}$ =7.903 p=0.006*, $F_{\text{Sound Isolation}}$ =4.549 p=0.026*) (p<0.05) but there was no statistically significant difference between the intervention types ($F_{\text{0th min}}$ =0.129 p=0.880, $F_{\text{30th min}}$ =0.055 p=0.947, $F_{\text{60th min}}$ =0.053 p=0.949) (p>0.05) (Table 2).

As a result of the comparison of CPOT scores of the patients participating in the study according to the intervention types and time, there was a statistically significant difference in CPOT scores in terms of all three intervention types ($F_{\text{Western Classical Music}}$ =9.471 p=0.000*, $F_{\text{Turkish Classical Music}}$ =19.993 p=0.000*, $F_{\text{Sound Isolation}}$ =11.635 p=0.000*) (p<0.05) but no statistically significant difference was found between the intervention types ($F_{\text{0th min}}$ =0.090 p=0.914, $F_{\text{30th min}}$ =0.464 p=0.631, $F_{\text{60th min}}$ =0.357 p=0.701) (p>0.05) (Table 3).

As a result of the comparison of AACNSAS consciousness subdimension scores of the patients participating in the study according to the intervention types and time, there was no statistically significant difference in all three intervention types ($F_{\text{Western Classical Music}}$ =1.000 p=0.376*, $F_{\text{Turkish Classical Music}}$ =1.000 p=0.376*, $F_{\text{Sound Isolation}}$ =1.000 p=0.376*) (p>0.05) and also no statistically significant difference was found between the intervention types ($F_{\text{0th min}}$ =0.015 p=0.985, $F_{\text{30th min}}$ =0.000 p=1.000, $F_{\text{60th min}}$ =0.000 p=1.000) (p>0.05) (Table 4).

Table 2. Change in patients' hemodynamic values according to intervention types and time

		Baseline (1)		30th minute during the intervention (2)		60th minute after the intervention (3)		F	p	Effect size	Bonferroni
		$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD				
Systolic blood pressure	Western Classical Music	129.58	16.34	122.20	16.05	116.50	15.59	19.796	0.000*	0.463	1>2, 1>3, 2>3
	Turkish Classical Music	126.37	17.36	121.87	15.66	115.25	14.35	34.945	0.000*	0.603	1>2, 1>3, 2>3
	Sound isolation	129.83	18.24	124.12	16.28	119.54	15.78	49.979	0.000*	0.685	1>2, 1>3, 2>3
	F	0.297		0.138		0.502					
	p	0.744		0.871		0.607					
Diastolic blood pressure	Western Classical Music	66.37	12.88	64.45	12.67	61.58	11.66	11.289	0.001*	0.329	1>2, 1>3, 2>3
	Turkish Classical Music	64.87	12.11	63.66	12.15	61.87	11.84	13.194	0.000*	0.365	1>3, 2>3
	Sound isolation	65.75	11.76	64.62	11.38	63.29	10.83	19.448	0.000*	0.458	1>2, 1>3, 2>3
	F	0.091		0.043		0.914					
	p	0.914		0.958		0.859					
Pulse rate	Western Classical Music	94.20	13.47	91.66	14.68	90.62	13.62	19.785	0.000*	0.462	1>2, 1>3
	Turkish Classical Music	94.54	14.00	90.95	13.78	89.50	13.04	31.722	0.000*	0.580	1>2, 1>3, 2>3
	Sound isolation	94.16	13.85	91.29	12.51	90.00	12.90	41.979	0.000*	0.646	1>2, 1>3, 2>3
	F	0.005		0.016		0.044					
	p	0.995		0.984		0.957					
Respiratory rate	Western Classical Music	20.79	3.98	19.37	4.20	18.87	3.89	24.863	0.000*	0.519	1>2, 1>3
	Turkish Classical Music	19.91	3.46	18.37	3.13	18.25	2.99	14.134	0.000*	0.381	1>2, 1>3
	Sound isolation	20.41	3.97	19.16	3.44	18.45	3.42	14.511	0.000*	0.387	1>2, 1>3
	F	0.317		0.508		0.203					
	p	0.729		0.604		0.817					
Oxygen saturation	Western Classical Music	98.45	1.64	98.58	1.38	98.70	1.39	1.302	0.282	0.054	-
	Turkish Classical Music	98.41	1.34	98.70	1.33	98.91	1.17	3.671	0.033*	0.138	3>1
	Sound isolation	98.54	1.44	98.66	1.49	98.66	1.30	0.418	0.661	0.018	-
	F	0.044		0.049		0.256					
	p	0.957		0.952		0.775					
Expiratory minute volume	Western Classical Music	9.10	2.35	8.72	2.25	8.40	2.16	7.903	0.006*	0.256	1>2, 1>3
	Turkish Classical Music	8.75	2.36	8.61	2.23	8.45	2.21	3.642	0.056	0.137	-
	Sound isolation	8.95	2.42	8.82	2.16	8.59	1.91	4.549	0.026*	0.165	2>3
	F	0.129		0.055		0.053					
	p	0.880		0.947		0.949					

*p<0.05. SD: Standard deviation

Table 3. Change in patients' CPOT scores according to intervention types and time

		Baseline (1)		30th Minute during the intervention (2)		60th minute after the intervention (3)		F	p	Effect size	Bonferroni
		$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD				
CPOT score	Western Classical Music	3.33	0.63	3.08	0.58	2.87	0.74	9.471	0.002*	0.292	1>2, 1>3
	Turkish Classical Music	3.29	0.55	2.87	0.53	2.70	0.55	19.993	0.000*	0.464	1>2, 1>3
	Sound isolation	3.37	0.82	3.04	1.12	2.83	0.81	11.635	0.000*	0.336	1>2, 1>3
	F	0.090		0.464		0.357					
	p	0.914		0.631		0.701					

*p<0.05. CPOT: Critical-Care Pain Observation Tool, SD: standard deviation

Table 4. Change in patients' AACNSAS subdimension scores according to intervention types and time

		Baseline (1)		30th minute during the intervention (2)		60th minute after the intervention (3)		F	p	Effect size	Bonferroni
		$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD				
Consciousness	Western Classical Music	2.13	0.81	2.08	0.79	2.08	0.79	1.000	0.376	0.043	-
	Turkish Classical Music	2.16	0.81	2.12	0.79	2.12	0.79	1.000	0.376	0.042	-
	Sound isolation	2.16	0.81	2.12	0.79	2.12	0.79	1.000	0.376	0.042	-
	F	0.015		0.000		0.000					
	p	0.985		1.000		1.000					
Agitation	Western Classical Music	4.62	1.37	4.20	1.21	4.04	1.08	10.310	0.001*	0.310	1>2, 1>3
	Turkish Classical Music	4.50	1.25	4.25	1.18	3.91	1.21	11.986	0.000*	0.343	1>3, 2>3
	Sound isolation	4.41	1.47	4.25	1.45	4.04	1.26	5.590	0.017*	0.196	1>3
	F	0.141		0.008		0.088					
	p	0.869		0.992		0.916					
Anxiety	Western Classical Music	2.08	0.58	2.08	0.58	1.95	0.46	3.286	0.046*	0.125	1>2, 1>3
	Turkish Classical Music	2.04	0.55	1.87	0.61	1.75	0.53	6.496	0.003*	0.220	1>3
	Sound isolation	2.20	0.65	2.04	0.69	1.91	0.58	6.496	0.003*	0.220	1>3
	F	0.503		0.734		1.043					
	p	0.607		0.484		0.358					
Sleep	Western Classical Music	4.58	1.76	4.58	1.76	4.54	1.81	1.000	0.376	0.042	-
	Turkish Classical Music	4.54	1.81	4.54	1.81	4.54	1.81	-	-	-	-
	Sound isolation	4.54	1.81	4.54	1.81	4.54	1.81	-	-	-	-
	F	0.004		0.026		0.000					
	p	0.996		0.974		1.000					
Patient-ventilator synchrony	Western Classical Music	1.79	0.83	1.70	0.69	1.70	0.68	2.091	0.135	0.083	-
	Turkish Classical Music	1.79	0.77	1.70	0.69	1.70	0.69	2.091	0.135	0.083	-
	Sound isolation	1.75	0.79	1.75	0.79	1.75	0.79	-	-	-	-
	F	0.022		0.033		0.026					
	p	0.979		0.967		0.974					

*p<0.05. AACNSAS: American Association of Critical Care Nurses Sedation Assessment scale, SD: standard deviation

As a result of the comparison of AACNSAS agitation subdimension scores of the patients participating in the study according to the intervention types and time, there was a statistically significant difference in all three intervention types ($F_{\text{Western Classical Music}}$ =10.310 p=0.001*, $F_{\text{Turkish Classical Music}}$ =11.986 p=0.000*, $F_{\text{Sound Isolation}}$ =5.590 p=0.017*) (p<0.05) but no statistically significant difference was found between the intervention types ($F_{\text{0th min}}$ =0.141 p=0.869, $F_{\text{30th min}}$ =0.008 p=0.992, $F_{\text{60th min}}$ =0.088 p=0.916) (p>0.05) (Table 4).

As a result of the comparison of AACNSAS anxiety subdimension scores of the patients participating in the study according to the intervention types and time, there was a statistically significant difference in all three intervention types ($F_{\text{Western Classical Music}}$ =3.286 p=0.046*, $F_{\text{Turkish Classical Music}}$ =6.496 p=0.003*, $F_{\text{Sound Isolation}}$ =6.496 p=0.003*) (p<0.05) but no statistically significant difference was found between the intervention types ($F_{\text{0th min}}$ =0.503 p=0.607, $F_{\text{30th min}}$ =0.734 p=0.484, $F_{\text{60th min}}$ =1.043 p=0.358) (p>0.05) (Table 4).

As a result of the comparison of AACNSAS sleep subdimension scores of the patients participating in the study according to the intervention types and time, there was no statistically significant difference in all three intervention types (F=1.000 p=0.376) (p>0.05) and also no statistically significant difference was found between the intervention types ($F_{\text{0th min}}$ =0.004 p=0.996, $F_{\text{30th min}}$ =0.026 p=0.974, $F_{\text{60th min}}$ =0.000 p=1.000) (p>0.05) (Table 4).

As a result of the comparison of AACNSAS patient-ventilator subdimension scores of the patients participating in the study according to the intervention types and time, there was no statistically significant difference in all three intervention types (F=2.091 p=0.135) (p>0.05) and also no statistically significant difference was found between the intervention types ($F_{\text{0th min}}$ =0.022 p=0.979, $F_{\text{30th min}}$ =0.033 p=0.967, $F_{\text{60th min}}$ =0.026 p=0.974) (p>0.05) (Table 4).

Discussion

This research reveals the effect of music therapy and sound isolation in improving the comfort of mechanically ventilated patients.

Music therapy has been used as a therapeutic intervention since the middle of the 20th century and its clinical use has gradually increased in recent years. Noises at different levels arising from the nature of the intensive care environment reveal the necessity of sound isolation to improve the comfort area of patients. In this context, in our study, music therapy and sound isolation were used as a nursing intervention to ensure relaxation, reduce anxiety, facilitate relaxion, reduce the need for sedation therapy, and improve comfort in patients.

In our study, it was seen that music therapy administered with both Turkish and Western Classical Music reduced the systolic blood pressure, diastolic blood pressure, pulse rate, and respiratory rate values of the patients. On the other hand, the oxygen saturation value increased only with the Turkish Classical Music intervention and this increase demonstrated the relaxation of patients and stabilization of respiratory functions. When the literature was examined, it was seen that music therapy administered to mechanically ventilated patients provides a significant decrease in systolic blood pressure, diastolic blood pressure, pulse rate, and respiratory rate and increases the oxygen saturation value (29,36-40).

In our study, it was observed that the mean AANCSAS subdimension scores of patients who received music therapy and sound isolation tended to decrease with music therapy. In the evaluations of these subdimensions, the best state is expressed with 1 point and the worst state is expressed with 5 points. If the score obtained from each subdimension is less than 2, the patient's need for sedation decreases. Accordingly, in our study, it was seen that music therapy reduced the need for sedation in patients and positively affected the sedation levels. Yaman Aktaş and Karabulut (41) determined the effect of music therapy on sedation levels of mechanically ventilated patients using the Ramsay Sedation scale and found that music therapy reduced patients' sedation scores. Again, in a similar study conducted by Dijkstra et al. (42), it was determined that music therapy reduced the sedation levels of patients. Mateu-Capell et al. (2) observed in their study that there was no statistically significant difference in sedation levels (42).

In our study, it was observed that the mean CPOT scores of the patients who received music therapy and sound isolation interventions tended to decrease with music therapy and sound isolation interventions. In the study conducted by Aktaş and Karabulut (43) using the Behavioral Pain scale and CPOT, it was found that the pain scores of the individuals were high before the music application and that both pain scores in the intervention group decreased significantly at the end of 20-minute music therapy. Tan et al. (44) conducted a study to investigate the effectiveness of music therapy on pain, anxiety, and muscle tension levels of patients receiving burn treatment during dressing changes.

Patients received music therapy on two successive days and at the end of the study, it was found that there was a significant decrease in the pain level experienced during dressing change in patients who received music therapy (44). In a randomized controlled study by Gutgsell et al. (45), the intervention group listened to music for 20 minutes and the control group received no intervention. It was stated that there was a decrease in the perceived pain severity in the intervention group patients after the intervention (45). In a randomized controlled study conducted by Liu and Petrini (39), it was found that there was a significant decrease in the pain level as a result of a 30-minute music therapy applied to patients.

Implications and Recommendations for Practice

Music therapy and sound isolation methods should be used for mechanically ventilated patients as part of the complementary and integrative care applications and be included in nursing care since these interventions reduce anxiety, stress, tension, increase relaxation and blood circulation, provide hemostasis, improve the quality of life, increase the comfort level, and also have no side effect. These methods should be included in curricula of nursing education and in-service training of working nurses. Further studies should be conducted to demonstrate the effectiveness of sound isolation in a larger sample group and contribute to the literature.

Conclusion

In conclusion, music therapy and sound isolation interventions administered to mechanically ventilated patients positively affected the hemodynamic parameters of the patients and reduced the severity of pain perceived by the patients and the need for sedation. In this context, the most important finding of the study was that an intervention that eliminates the noise in the intensive care environment for mechanically ventilated patients increases the comfort level of the patients.

Ethics

Ethics Committee Approval: The ethics approval of the study was approved by the Clinical Research Ethics Committee of Manisa Celal Bayar University Faculty of Medicine (decision no: 49, date: 07.10.2019).

Informed Consent: After the first interview held with the researchers, the patients' relatives were informed and their verbal and written consent was taken.

Authorship Contributions

Surgical and Medical Practices: S.Ç., Concept: S.Ç., E.A., M.U., Design: S.Ç., E.A., M.U., Data Collection and Process: S.Ç., Analysis or Interpretation: S.Ç., E.A., M.U., Literature Search: S.Ç., E.A., M.U., Writing: S.Ç.

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