

Effectiveness of Audio-Visual Play on the Comfort & Physiological Parameters of Hospitalized Toddlers During Nebulization in Selected Hospital in UAE

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Abstract

Background: In the realm of pediatric healthcare, ensuring the well-being and comfort of hospitalized toddlers is of paramount importance. Hospitalization and the various procedures during hospitalization, although essential for treatment, can be of great stress and anxiety among young patients. One such procedure is nebulization, which is a common procedure involving the administration of medication through inhalation. Finding innovative ways to alleviate the discomfort experienced by toddlers during such procedures is a significant focus of nurse researchers.

Purpose: To assess the effectiveness of audio-visual play on the comfort level & physiological parameters of hospitalized toddlers during nebulization in selected hospital in UAE.

Methods: A quasi-experimental study design with convenience sampling was used to choose 60 toddlers with 30 each for the experimental and control groups. Socio-demographic data was collected using the Demographic data sheet, while the clinical data was retrieved using the Clinical data sheet. The comfort level of the toddlers was assessed using the CEMS (Children's Emotional Manifestation Scale) and physiological parameters using the Clinical Parameters assessment sheet. The data analysis was conducted using the Statistical Package for Social Sciences (SPSS) software version 26.

Results: The study findings showed that children in the experimental group experienced reduced anxiety and enhanced comfort during the nebulization procedure, attributed to the incorporation of audio-visual play. A significant association was found only between previous hospitalization and the increased level of comfort among toddlers. There was no significant association between any of the selected clinical variables with the physiological parameters of the toddlers.

Conclusion: Hospitalized toddlers enjoy increased comfort during nebulization when audio-visual play is incorporated.

Keywords: Audio-Visual Play, Comfort Level, Physiological Parameters, Toddlers, Nebulization

1. Introduction

1.1. Background

Toddlers are prone to several common illnesses that affect their overall health and well-being. Globally, respiratory illnesses such as the common cold, bronchiolitis, and pneumonia are among the most prevalent in this age group [1]. These illnesses are often

caused by viral infections and can lead to serious complications such as dehydration, respiratory distress, and, to a lesser extent, disability and even death [2]. Respiratory illnesses are among the most common illnesses in toddlers aged 1 to 3 years in the United Arab Emirates (UAE). According to a systematic review of common childhood illnesses in the UAE, acute respiratory

tract infections (ARTIs) were the most prevalent illnesses in this age group [3]. These illnesses can have a significant impact on toddlers, particularly those between the ages of 1 and 3 years. They can cause a range of symptoms, including coughing, sneezing, congestion, and fever, which can lead to discomfort, irritability, and disrupted sleep [4]. In some cases, respiratory illnesses can also lead to more serious complications, such as pneumonia or bronchiolitis, which may require hospitalization and can affect a toddler's mental and emotional well-being. For example, the discomfort and distress caused by illness can lead to increased fussiness, anxiety, and irritability, which can affect their behavior and overall mood [5].

Toddlers and younger children mainly suffer from respiratory issues, unlike adults. They are often treated with nebulization, and most of them recover with nebulization alone, while some require nebulization along with other therapeutic and non-therapeutic management. Drug delivery through aerosol therapy has been recognized since its use in ancient Egypt for its potential to treat respiratory illnesses [6]. Several medications can be administered in the form of nebulizers. Even normal saline, when given as nebulization, can help in moisturizing the upper respiratory tract and aid in relieving congestion and cough [7]. It is considered more feasible as it does not impose any discomfort in the form of pain. As nebulization plays an important role in treating children, it must be administered effectively. While some toddlers and young children stay calm during nebulization, a greater majority resist being held for the procedure. The resistance is usually seen in children from infancy until the end of the toddler stage [8]. The irony is that it is at this age that most of these children get admitted to healthcare facilities with respiratory illnesses, posing a greater need for the use of nebulizers. When the child refuses to adhere to the medication regime, they tend to stay sick and worsen [9]. Several technologies have been introduced to improve the effectiveness of administered nebulization to reduce resistance from toddlers and young children during the procedure. One of these technologies is the use of Aerogen nebulizers, which operate without the sound produced by traditional nebulizers [10]. However, even with these advanced technologies, many toddlers and young children do not remain calm during nebulization [11].

Various studies have been conducted to discover ways to increase the effectiveness of nebulization through distractions that can keep toddlers and young children engaged during the procedure. Distractions can include toys, video games, watching cartoons, rhymes, distraction cards, listening to music, and more [12]. It has been discovered that there are barely any studies conducted in the UAE that assess the effectiveness of distractions among hospitalized toddlers during nebulization [13]. Thus, the researcher aims to assess the effectiveness of a type of distraction known as audio-visual play, on comfort and physiological parameters of hospitalized toddlers during nebulization [14]. There can be various factors that contribute to toddlers' resistance and poor compliance; being hospitalized itself is a stress factor for the child.

To assess this, audio-visual play will be provided to toddlers, who will be compared to another group acting as a control group for their comfort and physiological factors before, during, and after the administration of nebulization [15].

1.2. Purpose

The purpose of the study is to assess the effectiveness of audio-visual play on the comfort level & physiological parameters of hospitalized toddlers during nebulization in selected hospital in UAE. Three research questions were framed to address the purpose:

1. What is the effect of audio-visual play on comfort level among experimental group of hospitalized toddlers during nebulization?
2. Is there an association between the comfort level of experimental and control groups of hospitalized toddlers during nebulization and the selected variables like gender?
3. What is the association between the physiological parameters of experimental and control groups of hospitalized toddlers during nebulization with the selected clinical variables like duration of illness, length of stay, previous hospitalization, clinical diagnosis?

2. Methods

2.1. Design and Target Population

In this study, a quasi-experimental design was employed, incorporating both experimental and control groups, to conduct an interventional investigation. The research was conducted in 2023 within the Pediatric wards of a designated hospital in the United Arab Emirates. The target population comprised children aged 1 to 3 years who were admitted to these wards due to respiratory illnesses necessitating nebulization. Sampling was conducted from the accessible population of toddlers (aged 1 to 3 years) admitted to Pediatric Wards 1 and 2 with respiratory illnesses. The sample size, calculated with a 95% confidence level and 5% margin of error using Rao's software, was determined to be 60, drawn from an accessible population of 70 patients within the Pediatric Wards. Convenience sampling, a non-probability technique, was utilized to select participants and assign them to either the experimental or control group.

Inclusion criteria encompassed children with normal growth and development aged 1 to 3 years, undergoing nebulization during hospitalization, and exhibiting discomfort or irritability during the procedure as assessed by the Children's Emotional Manifestation Scale (CEMS). Exclusion criteria included children with respiratory distress identified using the Paediatric Respiratory Severity Score (PRESS), absence of anxiety as identified by the CEMS, congenital anomalies, developmental delays, dehydration, or any discomfort potentially affecting their response to nebulization, such as fever or pain. The convenience sampling approach involved assessing the eligibility of toddlers admitted to the Pediatric Wards with respiratory illnesses. Only those meeting all inclusion criteria were included as study participants. Additionally, participants were evaluated for respiratory distress using the PRESS, which considers heart rate, wheezing, accessory muscle use, peripheral

oxygen saturation, and feeding difficulties. Children with scores of 0 or 1 (indicating no or mild distress) were eligible for inclusion. Participants were assigned to either the experimental or control group in an alternating fashion, with the first sample selected for the study allocated to the experimental group.

2.2. Data Collection

Data collection occurred from March to June 2023. The comfort level of children was assessed using the Children's Emotional Manifestation Scale (CEMS), a tool developed by Ho Cheung William & Violeta Lopez in 2005. Permission to use the tool was obtained from the authors, and its reliability (0.80) and content validity index (96%) were established. The CEMS score, ranging from 5 to 25, was derived by assigning values to observed behaviors, with higher scores indicating greater discomfort. Additionally, a demographic profile form comprising socio-demographic and clinical data was developed. Participants were selected based on inclusion criteria using convenience sampling, with 30 allocated to the experimental group and 30 to the control group. The experimental group received audio-visual play (cartoons for ages 2-3 and rhymes for 1-year-olds) during nebulization, while the control group received routine care. Audio-visual play commenced 10 minutes before nebulization and continued until 10 minutes after completion. Comfort levels and physiological parameters (oxygen saturation, respiratory rate, peripheral pulse rate) were assessed at three intervals: 10 minutes before, 5 minutes after initiation, and 10 minutes after completion of nebulization. Physiological parameters were measured using appropriate devices, and comfort levels were evaluated using the CEMS.

2.3. Ethical Issues and Approval

Ethical approval was obtained from both the RAK Medical & Health Sciences University Research Ethical Committee (RAKMHSU-REC) and the Ras Al Khaimah Research Ethical Committee (RAK REC). The research proposal received initial approval from RAKMHSU-REC on 07/12/2022, with the approval code RAKMHSU-REC-135-2022/23-PG-N. Subsequently, approval was obtained from RAK REC with reference number MOHAP/REC/2022/54-2022-PG-N on 01/03/2023. Approval from the hospital authorities, including the hospital director, assistant director of nursing, and head of the Pediatric Ward department, was also secured prior to commencing data collection. Parents of the participants were informed about the voluntary nature of participation and their right to withdraw from the study at any time. Participant anonymity was maintained through the use of code numbers, and all personal data were kept confidential

and stored securely with password protection. Participants were selected using simple random sampling, and written informed consent was obtained from their parents before data collection commenced. Data files were securely stored and accessible only for research purposes.

2.4. Statistical Analyses

In the statistical analysis, data were analyzed using the Statistical Package for Social Sciences (SPSS) software version 26. Multiple functions within SPSS were utilized to conduct various analyses. Descriptive statistics were employed to summarize the characteristics of the study participants and the variables under investigation. This included calculating measures such as mean, median, standard deviation, and range to describe the central tendency and dispersion of the data. A t-test was utilized to compare the scores obtained from the Children's Emotional Manifestation Scale (CEMS) across different time points: preprocedural assessment, intraprocedural assessment, and post-procedural assessment. Additionally, the t-test was used to compare the preprocedural and post-procedural scores obtained from the clinical parameter's assessment form. This analysis aimed to assess whether there were significant differences in emotional manifestation scores and clinical parameters before and after the procedure.

Pearson's Chi-squared test was employed to explore the association between demographic variables (such as age, gender, nationality) and the CEMS scores. This statistical test helped determine whether there were any significant relationships or associations between demographic factors and the emotional manifestation levels observed in the study participants. Furthermore, the Chi-squared test was utilized to investigate the association between clinical variables (such as diagnosis, previous medical history, nebulization history) and CEMS scores. This analysis aimed to identify any potential relationships between clinical factors and the emotional responses of the toddlers during the nebulization procedure. Overall, these statistical analyses were crucial in examining the emotional responses of toddlers during nebulization and exploring potential associations between demographic and clinical variables with emotional manifestation levels.

3. Results

3.1. Participants

A total of 60 candidates participated in the study. The demographic characteristics of the participants are presented in Table 1.

Demographic characteristics		Interventional group		Control group	
		Frequency (f)	Percent (%)	Frequency(f)	Percent (%)
Gender					
	Male	15	50	13	43.3
	Female	15	50	17	56.7
Age					
	1 year	7	23.4	8	26.7
	2 years	10	33.3	14	46.6
	3 years	13	43.3	8	26.7
Nationality					
	Citizen patient	23	76.6	20	66.6
	Non-citizen patient	7	23.4	10	33.3
Length of stay in the hospital					
	1 day	14	46.66	7	23.33
	2 days	10	33.34	13	43.33
	3 days	6	20.00	10	33.34
Nebulization taken by siblings previously					
	Yes	28	93.34	19	63.34
	No	2	6.66	11	36.66
Child's attender during hospitalization					
	Mother	23	88.33	26	93.33
	Father	6	10.00	2	3.33
	Nanny	1	1.67	1	1.67
	Sibling	0	0.00	1	1.67
Education level of attender					
	Graduate	5	16.66	9	30.00
	Secondary	6	20.00	4	13.33
	Primary	18	60.00	16	53.34
	No formal education	1	3.33	1	3.33
Note: This table demonstrates the distribution of study participants in the experimental and the control groups based on various socio-demographic variables.					

Table 1: Distribution of Study Participants based on Socio-Demographic Variables

3.2. Distribution of Effectiveness of Audio-Visual Play Therapy
Mean distribution of the CEMS score 10 minutes prior to initiation of nebulization among toddlers of experimental and control groups

The pretest CEMS scores exhibited no disparity in means between both groups, as the mean was 19 for both, with a t-value of 0.21, when the CEMS score 10 minutes prior to initiation of nebulization where compared between experimental and control groups. This implies that toddlers in both the experimental and control groups manifested comparable levels of discomfort prior to undergoing nebulization.

Mean distribution of the CEMS score 5 minutes after initiation of nebulization among toddlers of experimental and control groups

The means of the CEMS scores for toddlers in both the experimental and control groups were evaluated five minutes after the initiation of nebulization. The experimental group exhibited a mean score of 14, whereas the control group had a notably higher mean score of 21. This stark contrast underscores that children in the experimental group experienced reduced anxiety and enhanced comfort during the nebulization procedure, attributed to the incorporation of audio-visual play. This disparity is also evident from the calculated t-value, which was -10.354. The statistical significance is substantiated by the fact that $p < 0.05$.

Mean distribution of the CEMS score 10 minutes after completion of nebulization among toddlers of experimental and control groups

The mean score of the interventional group was 10, while that of the control group was 19. This disparity underscores the discernible variation in the comfort levels of toddlers between the experimental and control groups, attributed to the incorporation of audio-visual play. The corresponding t-value of -12.12 further substantiates this difference. Importantly, the distinction in mean values holds statistical significance ($p < 0.05$).

Mean distribution of pre-procedural assessment of physiological parameters of the experimental and control groups using Clinical parameters assessment form

Upon analyzing the mean distribution of the measured peripheral pulse rate, a notable discrepancy emerges in the mean values of toddlers between the two groups when assessed 10 minutes prior to administration of nebulization. Specifically, the experimental group exhibited a mean of 119, whereas the control group registered a mean of 131. This disparity indicates a heightened level of comfort among toddlers in the experimental group, observed 10 minutes prior to the initiation of nebulization. With a significance level of

$p < 0.05$, the null hypothesis is deemed to be rejected.

Likewise, when evaluating the mean distribution of toddlers' respiratory rates in the experimental group, a substantial difference becomes apparent when compared to the control group. The mean values deviated by a margin of 5, underscoring the enhanced ease in respiratory rates among toddlers exposed to audio-visual play, in contrast to those receiving routine care. The mean distribution of oxygen saturation exhibited a parallel pattern in both the experimental and control groups. Primarily, the children did not require oxygen support and maintained their oxygen saturation levels within the range of normal limits. With a p-value exceeding 0.05, the lack of statistical significance is evident.

Mean distribution of physiological parameters of the experimental and control groups after the administration of nebulization using Clinical parameters assessment form

The mean distribution of physiological parameters of the experimental and control groups after the administration of nebulization assessed using the clinical parameters assessment form is explained in Table 2.

Assessment 10 minutes after administration of nebulization	Experimental & Control groups	N	Mean	t-value	p-value
Peripheral pulse rate	Interventional group	30	99.200	-15.429	.000*
	Control group	30	128.600		
Respiratory rate	Interventional group	30	27.033	-5.462	.000*
	Control group	30	31.400		
Oxygen saturation	Interventional group	30	1.0000	-	
	Control group	30	1.0000		

Note: t-value cannot be computed for oxygen saturation as the standard deviations of both groups are 0.

Table 2: Mean Distribution of Physiological Parameters of the Experimental and Control Groups after the Administration of Nebulization using Clinical Parameters Assessment form (N=60)

4. Discussion

The first objective of this study centered on assessing the impact of audio-visual play on the comfort levels of hospitalized toddlers during nebulization. Results indicated a significant increase in comfort levels among toddlers exposed to audio-visual play, aligning with previous research emphasizing distraction techniques for anxiety alleviation [16]. Similarly, it was found that consistent outcomes, with a substantial reduction in anxiety levels among children undergoing nebulization when exposed to play therapy [17]. Conversely, Researches highlighted the effectiveness of virtual reality over audio-visual play in reducing anxiety during medical procedures [18]. Moreover, positive outcomes of therapeutic play in reducing postoperative discomfort and anxiety in hospitalized children were identified [19]. Further reinforcing the effectiveness of play therapy, nurse researchers observed a significant reduction in anxiety levels among hospitalized children

engaged in play sessions [20]. Various benefits of play were noted, including pain reduction and improved socialization [21]. Several studies supported these findings, demonstrating the efficacy of play therapy in reducing anxiety among hospitalized children [22]. Regarding demographic factors, no significant association were found between demographic variables and anxiety levels among hospitalized children, while Delvecchio highlighted the influence of previous hospitalization history on anxiety levels [22-24]. The second objective aimed to assess the association between comfort levels and socio-demographic variables, revealing a significant association only with previous hospitalization experience. Similarly, in the third objective, no significant association was found between physiological parameters and clinical variables. No notable association between clinical factors and anxiety levels among hospitalized children were found in any other research's [22].

4.1. Implications for Further Research

The findings from this study hold important implications for nursing across various domains. Practices such as audio-visual play can be implemented in clinical settings to improve the administration of nebulization for toddlers by reducing their anxiety and discomfort. Educating nursing students about the benefits of play therapies in pediatric care can help bridge the gap between research and practice, ensuring evidence-based approaches are utilized. Future research should explore the effectiveness of distraction techniques and play therapies in pediatric populations with chronic illnesses to enhance the quality of care. Additionally, expanding research geographically and across diverse ethnic groups can provide valuable insights and contribute to a more comprehensive understanding of pediatric care practices.

4.2. Strengths & Limitations

One of the major strengths of this study lies in its pioneering nature within the UAE context. It introduced the Children's Emotional Manifestation Scale (CEMS) tool, offering a unique approach to assess the comfort level of toddlers during nebulization therapy. By utilizing the CEMS tool, the study contributed significantly to the field by providing a standardized method to measure comfort levels in this specific population. This innovative approach not only enhances the understanding of how toddlers experience nebulization therapy but also offers valuable insights into strategies to improve their comfort during medical procedures. Several limitations were associated with the execution of this study. Firstly, the research design was quasi-experimental, limiting the feasibility of employing randomization techniques. Randomization is preferred for establishing balanced sample representation, and its absence in this study may have introduced bias. Additionally, the use of convenience sampling further constrained the study's generalizability, as it may not accurately represent the broader population. Furthermore, the timing of data collection posed a significant challenge due to fluctuations in the census of pediatric wards at Saqr Hospital. This resulted in a substantial reduction in the proposed sample size, potentially introducing bias and influencing the study's outcomes. Moreover, the relatively modest sample size of 30 participants per group and the study's localization to a single site limit the generalizability of the findings. A larger sample size and multi-site investigations are warranted to enhance the robustness and external validity of the study's conclusions.

4.3. Linking Evidence to Action

- Use of audio-visual play during nebulization can improve its effectiveness among toddlers as it can assist them to be more comfortable during the treatment.
- Physiological parameters of toddlers tend to improve during nebulization if they are provided audio-visual play during the treatment procedure.
- These recommendations collectively pave the way for a more robust and comprehensive body of research, poised to contribute significantly to the well-being of pediatric populations undergoing

medical procedures.

5. Conclusion

This study aimed to assess the effectiveness of audio-visual play on the comfort level and physiological parameters of hospitalized toddlers during nebulization in selected UAE hospitals. Future research avenues may delve into pediatric populations grappling with chronic illnesses. Investigating the effectiveness of distraction techniques and play therapies within the context of chronic conditions would yield valuable insights that could significantly impact the quality of care provided to these vulnerable groups. Expanding the geographical scope of research is yet another noteworthy proposition. Studies conducted in other countries and among distinct ethnic groups would offer a cross-cultural perspective, allowing for the identification of potential variations and nuances. The incorporation of additional objectives within these cross-cultural studies would further enrich the findings, yielding a more holistic understanding of the subject matter.

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