

The Effects of Swedish Massage on Sleep Quality and Quantity in Hospitalized Girls: A Randomized Controlled Trial

Yosra Raziani¹, Fatemeh Valizadeh², Faezeh Khanjarian³, Ali Kordi⁴, Mehdi Birjandi⁵,
Kimia Karami^{6*}

Abstract

Background: Hospitalization often disrupts children's sleep and may adversely affect their recovery process. Swedish massage, a relaxation technique, has shown potential benefits in improving sleep; however, evidence regarding its effectiveness in pediatric hospital settings remains limited.

Aim: This study aimed to investigate the effects of Swedish massage on sleep quality and sleep quantity in hospitalized children.

Method: In this randomized controlled trial, 70 hospitalized girls aged 4–12 years in Paveh, Kermanshah Province, Iran, were randomly assigned to either an intervention group (n=35) or a control group (n=35). The intervention group received a 30-minute session of Swedish massage administered by a trained nurse on three consecutive nights, whereas the control group received standard care. Mothers completed the Children's Sleep Habits Questionnaire (CSHQ) and a sleep log at baseline and after the intervention. Data were analyzed using independent-samples t-tests, repeated-measures analysis of variance (ANOVA), and generalized linear models (GLMs).

Results: At baseline, sleep quality did not differ significantly between the two groups ($p=0.30$). Following the intervention, sleep quality improved significantly in the intervention group compared with the control group ($p<0.001$). However, no significant between-group difference was observed in sleep quantity ($p=0.09$).

Implications for Practice: Swedish massage improved sleep quality but did not significantly affect sleep quantity. Training nurses in basic Swedish massage techniques may enhance patient comfort and facilitate recovery without requiring additional medical resources. This intervention should be considered for inclusion in clinical practice guidelines to promote holistic, evidence-based nursing care.

Keywords: Hospitalized Children, Sleep, Swedish Massage

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1. PhD Candidate, Yale School of Nursing, Yale University, New Haven, Connecticut, USA
 2. Associated Professor, Department of Nursing, School of Nursing & Midwifery, Lorestan University of Medical Sciences, Khorramabad, Iran
 3. MSN, Social Determinants of Health Research Center, School of Nursing and Midwifery, Lorestan University of Medical Sciences, Khorramabad, Iran
 4. Nursing student, Student Research Committee, School of Nursing and Midwifery, Lorestan University of Medical Sciences, Khorramabad, Iran
 5. Assistant Professor in Epidemiology, Department of Biostatistics and Epidemiology, School of Public Health and Nutrition, Lorestan University of Medical Sciences, Khorramabad, Iran
 6. Associated Professor, Department of Nursing, School of Nursing & Midwifery, Lorestan University of Medical Sciences, Khorramabad, Iran

* Corresponding Author Email: kbkarami@gmail.com

Introduction

Hospitalization is a common experience during childhood; approximately 30% of children are hospitalized at least once, and about 5% experience multiple hospital admissions (1). This is a stressful experience during childhood that can significantly disrupt children's sleep patterns and potentially delay recovery (2). Evidence indicates that sleep disturbances are more prevalent among girls than boys, and hospitalized girls appear to be particularly vulnerable to sleep problems, anxiety, and emotional distress associated with illness and hospitalization (3).

These sex-related differences highlight the need for targeted and gender-sensitive care strategies for hospitalized girls (4). Major stressors associated with hospitalization include separation from caregivers, pain, physical injury, and loss of control, with anxiety being the most common emotional response (5). Acute insomnia in hospitalized children is primarily attributed to illness, sleep-disrupting environmental factors, anxiety, and depression (6). Furthermore, the hospital environment frequently fails to accommodate children's natural sleep-wake cycles, particularly among girls, because of factors such as nighttime clinical procedures, environmental noise, lighting, and psychological stressors (7). In a study by Meltzer (2008), hospitalization was associated with increased nighttime awakenings, delayed bedtimes, and later morning awakenings. Additionally, 40% of hospitalized children required sleep medication during hospitalization, compared with only 2% before admission (8).

Pharmacological treatments for sleep disturbances in children are associated with potential adverse effects and clinical limitations, necessitating cautious use, particularly in female pediatric populations (9). Consequently, safe, non-invasive, and gender-sensitive non-pharmacological interventions have received increasing attention (10-12). Massage therapy, as a complementary and non-invasive intervention, has been shown to promote relaxation, reduce anxiety, and improve autonomic regulation, thereby potentially enhancing sleep quality (13, 14). The primary mechanism underlying the beneficial effects of massage therapy on sleep is believed to involve increased serotonin production, which contributes to melatonin synthesis and, consequently, sleep regulation (15). Various forms of massage therapy exist, including Swedish massage, reflexology, and shiatsu. Among these modalities, Swedish massage, also known as classical massage, is the most widely practiced technique in Western medicine and serves as the foundation for most massage training programs. This technique involves the application of light-to-moderate pressure to superficial muscles using oil or lotion and incorporates stretching, stroking in the direction of venous return, deep tissue manipulation to release adhesions, and vibration techniques to reduce neural excitability, alleviate muscle spasms, and relieve pain. Given these therapeutic benefits, Swedish massage may represent a promising non-pharmacological intervention for managing sleep disturbances in hospitalized children (16, 17).

Although previous studies have investigated the effects of Swedish massage on sleep in patients with chronic diseases such as thalassemia (17), patient undergoing hemodialysis (18) and children with diabetic children (19), and had demonstrated its benefits of massage in promoting physical development (20) and reducing anxiety (21), most of these studies were conducted either in adult populations or in mixed-sex pediatric samples without sex-specific analyses. Consequently, it remains unclear whether hospitalized girls, who reportedly experience greater anxiety sensitivity, emotional distress, and vulnerability to sleep disturbances during hospitalization, respond differently to massage-based interventions.

Moreover, children hospitalized with acute medical conditions are exposed to unique environmental stressors, including nighttime nursing procedures, unfamiliar surroundings, and separation-related anxiety, which differ substantially from the circumstances experienced by children receiving chronic outpatient care. Despite evidence indicating clinically meaningful sex-related differences in pediatric sleep patterns and stress responses, no previous randomized controlled trial has specifically evaluated the effects of Swedish massage on sleep outcomes exclusively among hospitalized girls. Therefore, the present study was designed to address this gender-sensitive and context-specific research gap by examining the effects of Swedish massage on sleep quality and sleep quantity in hospitalized girls, with a particular emphasis on gender-sensitive nursing care.

Methods

This randomized controlled trial was conducted in the pediatric ward of Paveh Hospital, Kermanshah Province, Iran, between January 2020 and October 2021. The sample size was estimated based on

statistical parameters reported by Papaconstantinou et al (22). Using G*Power software. Assuming an effect size of 0.87, a significance level (α) of 0.05, and a statistical power of 90%, the required sample size was calculated to be 28 participants per group. To account for potential attrition, the sample size was increased to 35 participants per group, resulting in a total sample of 70 participants. The study population consisted of all hospitalized girls aged 4–12 years admitted to the pediatric ward during the study period. Among 128 children screened for eligibility, those presenting with sleep disturbances were considered potential participants. After obtaining written informed consent and confirming eligibility criteria, 70 participants were enrolled in the study.

Participants were randomly allocated to either the intervention group or the control group using block randomization. Stratified block randomization was performed according to age (4–6 years and 7–12 years) and type of underlying disease to ensure baseline comparability between groups. Age stratification was based on developmental differences in sleep patterns during childhood. Underlying diseases were categorized according to the admitting physician's diagnosis as gastrointestinal disorders, respiratory disorders, urinary tract disorders, and febrile conditions without a definitive diagnosis at admission. Fever was considered a clinical symptom and was classified separately only when no specific underlying disease could be identified.

During the study, six participants withdrew from the intervention. The study was conducted and reported in accordance with the CONSORT 2010 guidelines for randomized controlled trials (Figure 1).

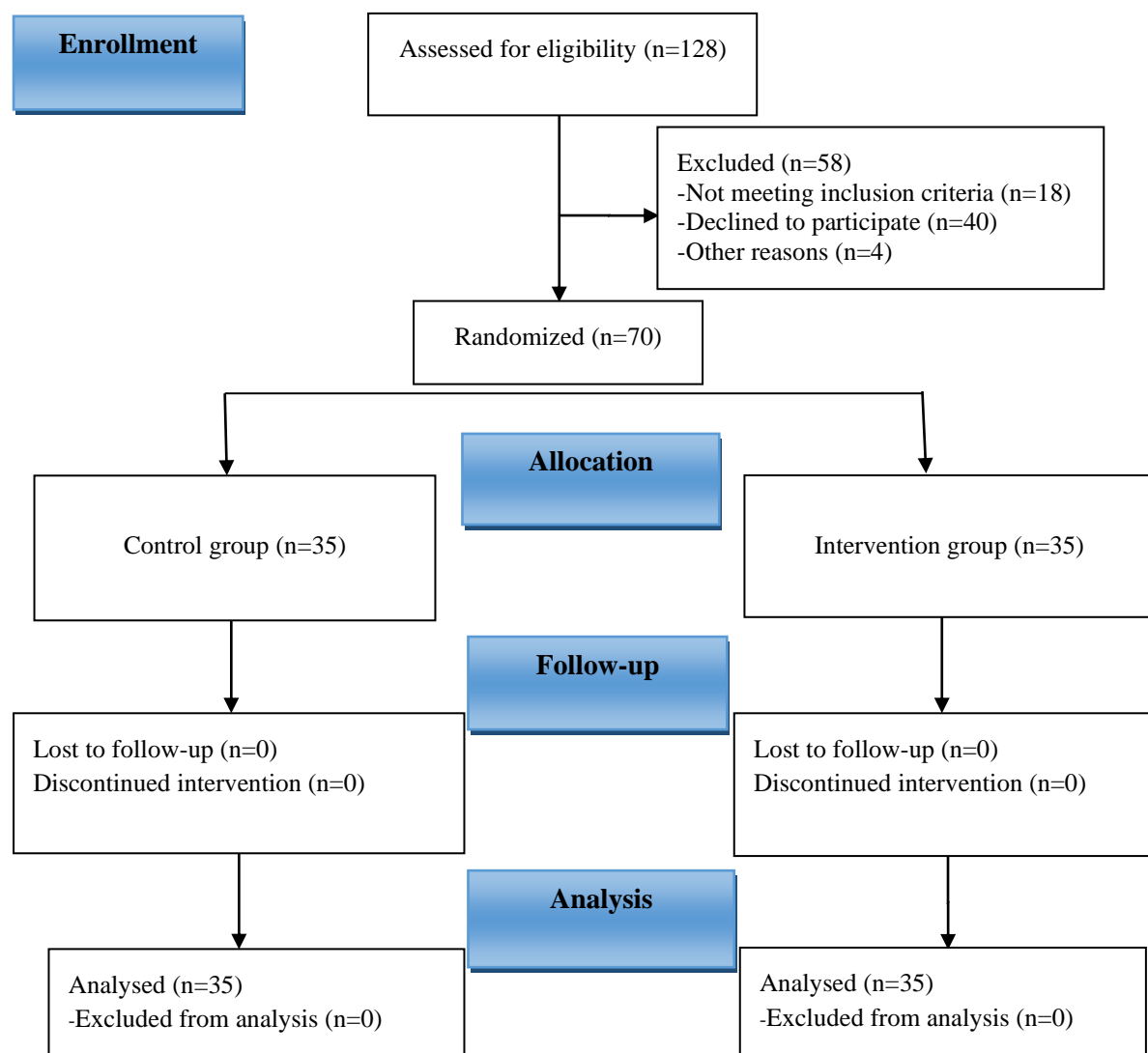


Figure 1. Flowchart of investigating the effects of Swedish massage on sleep quality and sleep quantity in hospitalized children

Inclusion Criteria were Female children aged 4–12 years, Hospitalization for at least five days, Full consciousness and willingness of both the child and parents to participate, Continuous maternal presence during hospitalization and score of ≥ 41 on the Children's Sleep Habits Questionnaire (CSHQ) following the first night of hospitalization. Exclusion Criteria: Diagnosis of intellectual disability or autism spectrum disorder, Presence of wounds or dermatological conditions affecting the back or lumbar region, Withdrawal of consent by either the mother or the child, Hospital discharge before completion of the three-day intervention period, Administration of sedative or hypnotic medications during the study period, Participation in other complementary interventions, including meditation, relaxation therapy, or similar programs, A history of sleep disturbances at home as reported by the mother.

Participants in the control group received routine pediatric nursing care, including medication administration, routine monitoring, and standard nursing interventions. No additional non-pharmacological or complementary interventions were provided. Participants assigned to the intervention group entered the study after providing written informed consent and receiving a detailed explanation of the study procedures. Baseline demographic characteristics, sleep-disrupting symptoms, and sleep quality and quantity were assessed using the study instrument. To optimize sleep conditions for both groups, nurses were informed about the study protocol. Environmental measures were implemented to minimize disturbances, including placing "Do Not Disturb – Patient Sleeping" signs, drawing bedside curtains, turning off unnecessary lights, and avoiding non-essential nursing procedures during sleeping hours. Swedish massage therapy was initiated on the second day of hospitalization. All massage sessions were administered by the principal researcher, who had completed a nationally certified training course in Swedish massage therapy. The pediatric ward consisted of two separate corridors. On each study day, one corridor was randomly assigned to the intervention group and the other to the control group. Patients in the two corridors had no contact with one another, thereby minimizing contamination between groups. Massage sessions were conducted in a quiet environment while the child rested on her bed. Direct pressure over bony prominences and massage of damaged, acne-prone, or infected skin areas were avoided. All rooms contained two beds and were maintained at a temperature between 20 and 24°C. Privacy was ensured by using a bedside screen during each intervention session. In cases where external disturbances, such as crying or restless children, interfered with sleep, participants were relocated to another bed with parental permission. During the intervention, the child initially lay in a supine position, and bitter almond oil was used as a lubricant. There is currently no evidence indicating that bitter almond oil directly affects children's sleep. The massage protocol followed a systematic sequence, beginning with the arms, neck, and head and subsequently progressing to the legs, thighs, hips, and back. Each participant received one 30-minute massage session on three consecutive nights following the administration of nighttime medications. The primary Swedish massage techniques included:

Effleurage: Long, gliding strokes using the palms to induce relaxation. **Tapotement:** Rhythmic tapping movements using the palms and fingers to stimulate muscles and relieve tension. **Vibration:** Gentle shaking movements to promote muscle relaxation. **Friction:** Circular movements intended to release muscle tension and improve circulation. The data collection instruments included: **Demographic Profile Questionnaire:** This questionnaire collected information regarding the child's age and parental educational and occupational status.

Children's Sleep Habits Questionnaire (CSHQ): Developed by Owens et al. (2000), the CSHQ consists of 45 items designed to assess children's sleep quality and sleep habits. The questionnaire is completed by mothers and is appropriate for children aged 4–12 years. It comprises eight subscales: bedtime resistance, sleep-onset delay, sleep duration, sleep anxiety, night awakenings, parasomnias, sleep-disordered breathing, and daytime sleepiness. Responses are scored on a three-point Likert scale ranging from 1 (rarely) to 3 (usually). The final four items assessing daytime sleepiness are scored from 1 (not sleepy) to 3 (falling asleep) (23) Total scores range from 33 to 99. The CSHQ was administered twice: on the first day of hospitalization and at the end of the third day following the intervention. A cut-off score of 41 was used to identify clinically significant sleep disturbances. Children with scores of ≥ 41 were included in the study. **Sleep Log (Assessment of Sleep Quantity):** Sleep quantity was assessed using a sleep log that measured total daily sleep duration (24), Behroozifar et al. translated and validated the Persian version of this instrument (25) The sleep log, structured in a tabular format, recorded sleep onset and wake-up times over a 24-hour period based on

maternal reports. The sleep log was completed on four occasions: baseline assessment and during the three-night intervention period, with an additional assessment on the fifth night to evaluate post-intervention sleep outcomes. Data collection was conducted at 8:00 AM each morning following the intervention nights. Content validity was established through review by academic experts, who confirmed that the questionnaire items adequately reflected the study objectives. Internal consistency reliability was assessed using Cronbach's alpha. Goodwin et al. (2008) reported Cronbach's alpha coefficients of 0.70 for the CSHQ subscales in a non-clinical sample of children aged 4–10 years, with two-week test–retest reliability coefficients ranging from 0.62 to 0.79. In the present study, the Cronbach's alpha coefficient was 0.73, indicating acceptable internal consistency (26). In addition, parents were asked to report any significant factors that might have influenced their child's sleep quality during hospitalization.

Sleep quality was assessed at two time points: baseline (the first day of hospitalization) and after completion of the three-day intervention. Sleep quantity was measured at four time points: baseline and at 24, 48, and 72 hours after hospitalization. Data were analyzed using SPSS version 22.0 (SPSS Inc., Chicago, IL, USA). Independent-samples t-tests and paired-samples t-tests were used to compare between-group and within-group differences, respectively. Repeated-measures analysis of variance (ANOVA) was employed to evaluate changes over time. Furthermore, generalized linear models (GLMs) were applied to assess the effects of the intervention on overall sleep quality and its subdomains while controlling for relevant background variables.

Ethical Consideration

This study was approved by the Ethics Committee of Lorestan University of Medical Sciences (Ethics Code: IR.LUMS.REC.1398.149) and was also registered in the Iranian Registry of Clinical Trials (IRCT20181012041316N2). The trial was conducted in accordance with the ethical principles of the Declaration of Helsinki and complied with Good Clinical Practice (GCP) guidelines. Written informed consent was obtained from the parents or legal guardians of all participating children.

Table 1. Participants' demographic characteristics at baseline (N=70)

Characteristics	Groups		P-value*
	Control N (%)	Intervention N (%)	
Age Group (years)			
4–6	15 (42.9)	16 (45.7)	0.81
7–12	20 (57.1)	19 (54.3)	
Place of Birth			
Urban	19 (54.3)	16 (45.7)	0.47
Rural	16 (45.7)	19 (54.3)	
Separate Bedroom			
Yes	19 (54.3)	20 (57.1)	0.13
No	16 (45.7)	15 (42.9)	
Birth Order			
First Child	19 (54.3)	24 (68.6)	0.29
Middle Child	15 (42.9)	10 (28.6)	
Last Child	1 (2.9)	1 (2.9)	
Number of Siblings			
One	16 (45.7)	11 (31.4)	0.27
Two	12 (34.3)	15 (42.9)	
Three or more	7 (20.0)	9 (25.8)	
Self-reported socioeconomic Status			
High	7 (20.0)	7 (20.0)	0.66
Moderate	22 (62.9)	19 (54.3)	
Low	6 (17.1)	9 (25.7)	
Type of Illness			
Gastrointestinal	14 (40.0)	13 (37.1)	0.94
Urinary	1 (2.9)	2 (5.7)	
Respiratory	8 (22.9)	8 (22.9)	
Fever (no definitive diagnosis)	12 (34.3)	12 (34.3)	

*Chi-square test

Results

The baseline demographic characteristics of the participants were comparable between the intervention and control groups, indicating no statistically significant differences between groups ($p>0.05$) (Table 1). The results of repeated-measures analysis of variance (ANOVA) showed that, irrespective of the duration of hospitalization, there was no statistically significant difference in mean sleep duration between the intervention and control groups ($p>0.05$) (Table 2). Within-group comparisons demonstrated that, in the control group, the total sleep quality score and its subscale scores increased following the study period, indicating a deterioration in sleep quality. In contrast, in the massage group, both the total sleep quality score and all subscale scores decreased significantly, reflecting an improvement in sleep quality. Furthermore, between-group comparisons using independent-samples t-tests revealed that, throughout the intervention period, the mean sleep quality scores in the massage group were significantly lower than those in the control group across all subscales, with the exception of the parasomnia subscale (Table 3). The generalized linear model (GLM) analysis demonstrated that, after adjusting for age, place of residence, bedroom availability, number of siblings, and socioeconomic status, the mean change in sleep quality score in the intervention group was, on average, 12.31 points lower than that in the control group ($\beta = -12.31$, 95% CI: -14.92 to -9.70). This reduction was statistically significant ($p<0.001$) (Table 4).

Table 2. Comparison of mean sleep duration in hospitalized girls in the control and massage groups during the study period

Sleep Duration (hours)	At Home (M ± SD)	Night of Hospitalization			Repeated measures ANOVA (F, P)		
		First (M ± SD)	Second (M ± SD)	Third (M ± SD)	Time Effect	Group Effect	Time × Group Interaction
Control Group	10.88 ± 1.65	8.22 ± 1.26	8.17 ± 1.09	8.11 ± 1.19	F=53.358	F=2.813,	F=6.83
Intervention Group	9.71 ± 1.46	7.42 ± 1.52	8.08 ± 1.13	8.74 ± 1.44	$p<0.001$	$p=0.098$	$p<0.001$

Table 3. Comparison of mean sleep quality and its subscales in children in the intervention and control groups before and after the intervention.

Variable	Group	Pre-test (M ± SD)	Post-test (M ± SD)	Difference (Pre-Post) (M ± SD)	Comparison (P value)	
					Within-group*	Between-group**
Overall Sleep Quality	Intervention	60.40 ± 3.77	50.40 ± 4.60	-10.00 ± 5.82	<0.001	<0.001
	Control	58.71 ± 4.11	61.02 ± 4.78	2.31 ± 6.28	0.03	
Sleep Resistance	Intervention	7.42 ± 1.14	5.68 ± 1.36	-1.74 ± 1.91	<0.001	<0.001
	Control	7.65 ± 1.05	7.85 ± 1.28	0.20 ± 1.58	0.46	
Sleep Onset Delay	Intervention	2.28 ± 0.89	1.60 ± 0.84	-0.68 ± 1.62	0.01	0.02
	Control	2.34 ± 0.68	2.37 ± 0.64	0.03 ± 0.85	0.84	
Sleep Duration	Intervention	6.08 ± 1.48	4.74 ± 1.14	-1.34 ± 1.60	<0.001	<0.001
	Control	5.77 ± 1.21	5.94 ± 1.13	0.17 ± 1.75	0.56	
Sleep Anxiety	Intervention	8.40 ± 2.14	7.02 ± 1.58	-1.37 ± 1.91	<0.001	<0.001
	Control	8.48 ± 1.24	8.25 ± 1.40	-0.22 ± 1.47	0.36	
Night Awakenings	Intervention	5.11 ± 1.18	3.54 ± 0.56	-1.57 ± 1.37	<0.001	<0.001
	Control	4.97 ± 0.98	5.08 ± 1.37	0.11 ± 1.77	0.70	
Parasomnia	Intervention	10.40 ± 1.86	9.80 ± 2.01	-0.60 ± 2.49	0.16	0.13
	Control	9.54 ± 1.35	9.77 ± 1.45	0.22 ± 2.04	0.51	
Sleep-Disordered Breathing	Intervention	3.54 ± 1.09	3.20 ± 0.47	-0.34 ± 1.10	0.07	0.01
	Control	3.22 ± 0.73	3.68 ± 1.32	0.45 ± 1.44	0.06	
Daytime Sleepiness	Intervention	17.14 ± 2.62	14.82 ± 2.66	-2.31 ± 3.21	<0.001	<0.001
	Control	16.71 ± 2.73	18.05 ± 2.88	1.34 ± 3.33	0.02	

* Paired t-test (within-group comparison)

** Independent t-test (between-group comparison)

Table 4. Modeling the effect of massage on changes in children's mean sleep quality with adjustment for baseline variables

Variable	B Coefficient	Standard Error (SE)	95% Confidence Interval for B	P-Value
Group				
Control	Reference			
Intervention	-12.31	1.33	(-14.92, -9.70)	<0.001
Age				
4–6 years	Reference			
7–12 years	-2.22	1.38	(-4.94, 0.49)	0.10
Place of Birth				
Urban	Reference			
Rural	1.07	1.38	(-1.63, 3.79)	0.43
Private Bedroom				
Yes	Reference			
No	1.22	1.55	(-1.82, 4.26)	0.43
Number of Siblings				
	-2.29	0.89	(-4.04, -0.54)	0.01
Family Economic Status				
Good	Reference			
Moderate	-4.01	2.05	(-8.02, 0.00)	0.05
Poor	-0.58	2.60	(-5.69, 4.52)	0.82

* Generalized Estimating Equation Model (GLM)

Discussion

The present randomized controlled trial evaluated the effects of Swedish massage on sleep quality and sleep duration in hospitalized girls, adopting a gender-sensitive framework. The findings demonstrated that Swedish massage significantly improved overall sleep quality and most of its subdomains; however, its effect on total sleep duration did not reach statistical significance. After adjusting for demographic and socioeconomic variables, the intervention remained independently associated with a clinically meaningful reduction in sleep disturbance scores. These findings highlight the potential of Swedish massage as a non-pharmacological, nurse-led intervention for improving sleep outcomes in hospitalized female pediatric patients.

Interpretation of Main Findings: Hospitalization is widely recognized as a major disruptor of pediatric sleep due to environmental factors (e.g., noise, light, and clinical interruptions) and psychological stressors such as separation anxiety and illness-related distress (2, 6). Evidence suggests that girls may be particularly vulnerable to sleep disturbances under stress due to higher anxiety sensitivity and emotional reactivity (2, 27). In this context, the present findings provide gender-specific evidence supporting the therapeutic role of massage therapy.

The significant reduction observed in total CSHQ scores and subdomains—including sleep resistance, sleep onset delay, sleep anxiety, night awakenings, and daytime sleepiness—suggests that Swedish massage primarily influenced the qualitative dimensions of sleep rather than sleep duration per se. This finding is clinically meaningful, as sleep quality is more strongly associated with psychological recovery and behavioral regulation in children than sleep quantity alone (28). The lack of statistically significant improvement in sleep duration is consistent with systematic reviews indicating that non-pharmacological interventions tend to produce stronger effects on subjective sleep quality compared to objective sleep duration (15). Hospital-related environmental disruptions may have attenuated measurable improvements in total sleep time despite enhanced relaxation and emotional regulation.

The results are consistent with Zaitun (2022), who reported improved sleep quality in children with thalassemia following Swedish massage (29) and with Ghanbari et al. (2022), who demonstrated beneficial effects of Swedish massage on sleep in hemodialysis patients (18). Similarly, Nezhad et al. (2024) found that Swedish massage was more effective than earplugs and eye masks in improving ICU patients' sleep quality (30). Massage-based bedtime routines have also shown positive effects in pediatric populations (31). However, inconsistencies exist in the literature. Yates et al. (2014) did not observe significant sleep improvements in infants following massage (32). These discrepancies may be attributed to differences in developmental stage, intervention duration, clinical setting, and outcome measurement tools. Unlike neonates, school-aged children have more developed cognitive

and emotional responses to stress, which may make them more responsive to relaxation-based interventions. Moreover, Wahyuni et al. (2020) reported significant improvements in sleep duration in infants receiving massage at home (33). The divergence from the present findings may be explained by the hospital environment, where unavoidable interruptions limit improvements in sleep duration.

The mechanisms underlying massage-related improvements in sleep are likely multifactorial. Massage therapy has been shown to enhance parasympathetic nervous system activity, reduce cortisol levels, and increase serotonin production, which is a precursor of melatonin (10). These neuroendocrine changes may facilitate sleep initiation and emotional regulation. From a psychosocial perspective, tactile stimulation in a safe and structured environment may enhance perceived security and reduce anxiety. Given that anxiety is strongly associated with sleep disturbances in children (27, 34), anxiety reduction may represent a key mediating pathway. This mechanism may be particularly relevant for girls, who tend to exhibit stronger psychophysiological stress responses (4). No significant improvement was observed in the parasomnia subscale. Parasomnias such as sleepwalking and night terrors are often associated with neurodevelopmental and intrinsic neurophysiological factors rather than situational stress alone (26). Lu et al. (2024) reported a high prevalence of parasomnia among school-aged children and its association with sleep onset delay (35). Given its complex etiology, massage therapy alone may be insufficient to modify this domain, and psychological or behavioral interventions such as cognitive-behavioral therapy may be required.

Clinical and Gender-Sensitive Implications: A major strength of this study is its gender-specific design, addressing a gap in pediatric sleep research where mixed-sex samples often obscure sex-specific effects. By focusing exclusively on girls, this study provides evidence aligned with gender-sensitive pediatric nursing practice (5). Given concerns regarding pharmacological sleep aids in children, Swedish massage represents a safe, low-cost, and non-invasive complementary intervention that can be delivered by trained nursing staff. Integration of structured massage protocols into pediatric care may enhance holistic nursing practice and reduce reliance on sedative medications.

Strengths of this study include randomized allocation, stratified block randomization, adjustment for confounders using a generalized linear model (GLM), and implementation in a real clinical hospital setting, which enhances ecological validity. Limitations include reliance on parent-reported sleep measures, potential environmental confounders, short intervention duration, and absence of objective sleep assessment tools such as actigraphy. Future studies should incorporate longer follow-up periods, objective sleep measurements, and comparative gender-based analyses.

Future trials should: Compare intervention effects between girls and boys using stratified or factorial designs, combine massage therapy with sleep hygiene and environmental modification strategies, investigate biological mediators such as cortisol and melatonin levels, Explore integration with structured anxiety-reduction interventions.

Implications for practice

The findings of this study demonstrate that Swedish massage can serve as a feasible, low-cost, and non-pharmacological nursing intervention to improve sleep quality in hospitalized girls. Integrating Swedish massage into routine pediatric nursing care may help reduce sleep-related anxiety, minimize nighttime awakenings, and create a more calming hospital environment that is conducive to recovery. Since nurses play a central role in the daily care of hospitalized children, providing them with structured training in basic Swedish massage techniques can enhance the quality of holistic nursing care without imposing additional financial or clinical burdens. This intervention aligns with the growing emphasis on complementary and non-pharmacological approaches in pediatric healthcare, offering a safe and accessible strategy for promoting children's well-being. Clinical guidelines and pediatric care protocols should consider incorporating Swedish massage as part of evidence-based nursing practice to support both the physical and psychological dimensions of pediatric patient care.

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Conflicts of interest

The authors declare no conflicts of interest.

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Authors' Contributions

K.K.: Led the study design, conducted the clinical trial, and drafted the manuscript. Y.R.: Conducted the clinical trial and prepared the initial draft of the manuscript. A.K.: Conducted the clinical trial and prepared the initial draft of the manuscript. F.V.: Provided methodological guidance and contributed to the study design. F.Kh.: Provided expert consultation and reviewed the manuscript. Dr. M.B.: Performed data analysis and interpretation. All authors reviewed and approved the final version of the manuscript.

Artificial Intelligence statement

The authors declare that no artificial intelligence (AI) tools or technologies were used in the preparation of this manuscript.

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