

Original Article

Effects of integrated nursing and psychological intervention on pain relief and patient satisfaction in urinary calculi patients

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Abstract: Objective: We aimed to assess the impact of integrated nursing and psychological intervention on pain intensity and patient satisfaction in individuals with urinary calculi. Methods: This retrospective study included 94 urological patients from the Sichuan Cancer Hospital & Institute, Sichuan Cancer Center, School of Medicine, University of Electronic Science and Technology of China, between January 2020 and June 2022. Participants were divided into a control group (n=48), receiving routine nursing and psychological intervention, and a study group (n=46), receiving integrated nursing and psychological intervention. We compared pain intensity, pain relief rate, patient satisfaction, Numeric Rating Scale (NRS) score, Pittsburgh Sleep Quality Index (PSQI) score, Self-rating Depression Scale (SDS) score, Self-rating Anxiety Scale (SAS) score, and quality of life scores between the groups. Results: The study group had shorter hospital stays and lower hospitalization costs than the control group (both $P < 0.05$). Pain relief and satisfaction rates were higher in the study group (both $P < 0.05$). Post-intervention, both groups showed significant reductions in NRS, PSQI, SDS, and SAS scores, with greater reductions in the study group (all $P < 0.05$). Quality of life scores increased in both groups, more so in the SG ($P < 0.05$). The study group also had fewer adverse events ($P < 0.05$). Both groups showed decreased serum creatinine and blood urea nitrogen levels post-intervention, with a more significant decline in the study group ($P < 0.05$). Education, marital status, and occupation were major factors influencing outcomes in urinary calculi patients. Conclusion: Integrated nursing and psychological intervention significantly alleviates pain, improves emotional well-being, enhances sleep quality, increases overall life quality, and contributes to high patient satisfaction among urinary calculi patients.

Keywords: Integrated nursing, psychological intervention, urinary calculi, pain management, patient satisfaction

Introduction

Urinary calculi, with high prevalence, cause significant pain, impairs quality of life and affects the mental health of patients [1]. Patients commonly experience intense waist or abdominal pain, nausea and vomiting due to the stones stimulating the urinary tract mucosa, leading to inflammation and edema. The unpredictability of urinary tract stones also causes anxiety, further affecting patients' men-

tal health. Current treatments like painkillers, urethra dilation, stone dissolution, and surgical resection have limitations, including insufficient symptom relief, risk of complications like urinary tract infections, and the trauma and recovery associated with surgery [2]. Thus, identifying more effective solutions is critical.

Recent advancements, such as ultrasonic lithotripsy and percutaneous nephroscopy technology have improved patient outcomes and

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surgical success rates. However, the importance of psychological care cannot be understated. Integrated nursing, a patient-centered nursing model, combines various techniques to offer personalized care, aiming to enhance quality of life and reduce healthcare costs for urinary calculi patients [3]. This has emerged as a prominent nursing trend, offering effective symptom management and improved patient outcomes. Psychological intervention, utilizing psychological theories and methods, helps patients manage their psychological state, alleviating stress and negative emotions associated with pain [4].

However, integrated nursing and psychological intervention remains underutilized in urinary calculi treatment, with limited research on its effects on pain management and nursing satisfaction [5, 6].

Therefore, the purpose of this study investigates the impact of integrated nursing combined with psychological intervention on pain intensity and nursing satisfaction in urinary calculi patients, aiming to provide a scientific basis for clinical nursing practices.

Materials and methods

Data collection

A retrospective analysis was performed on 94 urological patients at the Sichuan Cancer Hospital & Institute, Sichuan Cancer Center, School of Medicine, University of Electronic Science and Technology of China, from January 2020 to June 2022. Patients were allocated into two groups based on the nursing approach received: the control group, which underwent routine nursing plus psychological intervention (n=48), and the study group, which received integrated nursing plus psychological intervention (n=46). The study received approval from the Ethics Committee of the Sichuan Cancer Hospital & Institute, Sichuan Cancer Center, School of Medicine, University of Electronic Science and Technology of China.

Inclusion criteria: (1) Patients aged ≥ 18 years diagnosed with urinary calculi [7]. (2) Patients meeting the diagnostic criteria for urinary calculi [8]. (3) Patients willing and able to participate in the study and engage in integrated nursing and psychological intervention.

Exclusion criteria: (1) Patients without clear pain symptoms or those whose pain had already been alleviated. (2) Patients with serious comorbid conditions, such as malignancies, that could affect study results. (3) Patients with cognitive impairments or psychiatric conditions preventing effective participation in the study. (4) Pregnant or lactating women.

Methods

Psychological intervention: Both the control and study groups received psychological interventions, which included: (1) Emotional support which involved establishing positive communication with patients, listening to and respecting their emotional experiences, and providing encouragement to boost their confidence in overcoming the illness. (2) Communication therapy entailed direct interaction with psychologists or psychiatrists to help patients overcome psychological barriers and negative feelings, thus altering their cognitive and emotional reactions to pain. (3) Psychological support groups were organized to enable patients to share experiences and emotions, promoting mutual support and encouragement. (4) With attention to emotions, nurses monitor and respond to patients' emotional changes promptly, with a focus on alleviating negative emotions like depression and anxiety. (5) Emotional support activities included offering comfort, encouragement, and understanding to help patients feel secure, thereby enhancing their inner strength and motivation to tackle treatment and life challenges. (6) Positive emotion cultivation involved encouraging the development of positive emotional states, guiding patients to adopt a positive outlook, and fostering their self-confidence and hope, improving their disease coping abilities and overall quality of life.

Routine nursing in the control group: The control group received routine nursing care, which included: (1) Educational guidance included providing information on urinary calculi, including its causes, progression, and treatment options, to enhance patient understanding and treatment adherence. (2) Relaxation training consisted of teaching relaxation techniques like deep breathing and progressive muscle relaxation to alleviate anxiety, tension, and pain.

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Integrated nursing in the study group: The study group received integrated nursing in addition to the psychological intervention shared with the control group. The integrated nursing included: (1) Pain assessment which involved detailed evaluation of the pain experienced by patients with urinary calculi, focusing on its characteristics, intensity, location, and effects. (2) Continuous observation of vital physiological metrics such as blood urea nitrogen (BUN), serum creatinine (SCr), and urine pH were performed, to assess clinical status changes. Nurses were also attentive to acute pain symptoms for prompt intervention. (3) Pharmacological supervision entailed administering pain management medications strictly as prescribed by physicians, including nonsteroidal anti-inflammatory drugs, opioids, and antibiotics. (4) Catheterization care comprised performing catheterization to alleviate urinary tract obstruction, reduce pain and irritation. (5) Nutrition counseling covered providing dietary advice tailored to the patient's clinical symptoms, such as increasing fluid intake to facilitate stone passage and reducing salt and purine-rich foods to prevent stone formation.

Outcome measures

The Numerical Rating Scale (NRS) score for pain intensity: The NRS was used to measure pain intensity, with scores ranging from 0 (no pain) to 10 (extreme pain) [9]. Scores between 1-3 indicate mild pain, 4-6 moderate pain, and 7-9 severe pain, correlating directly with pain intensity.

Pain relief rate: Pain relief was categorized as: (1) No relief: No reduction in pain duration or intensity, or an increase in either. (2) Significant relief: Complete freedom from pain, allowing unrestricted movement. (3) Effective relief: Reduced pain duration and intensity, allowing movement with some effort. The pain relief rate formula: Pain relief rate = (effective relief + significant relief cases)/Total cases × 100%.

Patient satisfaction: Patient satisfaction was gauged using a self-designed questionnaire, with scores out of 100: dissatisfied (< 60), fair (60-80), satisfied (81-90), and very satisfied (> 90) [10]. Satisfaction percentage is calculated as: Satisfaction = (satisfied + very satisfied cases)/Total cases × 100%.

Pittsburgh Sleep Quality Index (PSQI) score: The PSQI assessed sleep quality, with a total score of 21 [11]. Lower scores indicate better sleep quality.

***Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) scores:* The SAS and SDS assessed anxiety and depression levels, respectively, with each scale having 20 items rated from 1 (least intense) to 4 (most intense) [12, 13].

***Quality of life:* The SF-36 scale evaluated quality of life across various domains, including mental health and physical functioning. Scores out of 100, with higher scores indicating better quality of life [14].

***Adverse events:* Monitored and recorded adverse events included renal extravasation, urinary tract infections, urine leakage, and postoperative hemorrhage during the perioperative period.

Renal function assessment: Patients had 3 mL of fasting venous blood drawn for analysis before and after the nursing intervention. Serum creatinine (SCr) and blood urea nitrogen (BUN) levels were measured using an automated biochemical analyzer.

Statistical analysis

Data were analyzed with SPSS version 22.0. Graphs were produced using GraphPad Prism version 8. Continuous variables were presented as mean ± standard deviation (SD). Categorical variables were represented as percentages, tested with the χ^2 test. Comparative analyses between the control group and study group before and after intervention were performed. A p -value < 0.05 was considered statistically significant.

Results

Comparison of general data

No significant differences in gender, age, or disease duration were found between the groups (all $P > 0.05$), indicating comparability (**Table 1**).

Comparison of hospital stays, pain duration, and costs

The study group had more patients with pain duration < 6 hours and fewer with ≥ 6 hours

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Table 1. Comparison of general data

Group	n	Gender		Age (years)	Duration of disease (month)
		Male	Female		
Control group	48	25	23	52.18±4.36	8.06±1.35
Study group	46	24	22	51.86±4.35	8.14±1.28
t	/	0.000		0.356	0.295
P	/	0.993		0.723	0.769

Comparison of patient satisfaction rate

The satisfaction rate in the study group was significantly higher than that in the control group ($P < 0.05$) (**Table 4**).

Comparison of NRS and PSQI score

No significant differences in NRS and PSQI scores were observed between the groups before the nursing intervention ($P > 0.05$). Post-intervention, both groups had significant reductions in these scores, with a more notable decline in the study group (both $P < 0.05$) (**Figure 2**).

Comparison of SAS and SDS scores

Before the intervention, the SAS and SDS scores were similar between the groups (both $P > 0.05$). Post-intervention, both groups saw significant reductions in SAS and SDS scores, with the study group experiencing greater decreases ($P < 0.05$) (**Table 5**).

Influential factors on prognosis

Education level, marital status, and occupation significantly impacted the prognosis of patients with urinary calculi (**Table 6**).

Comparison of quality of life

There was no significant difference in quality of life scores between the groups before the intervention ($P > 0.05$). Following the interventions, both groups showed significant improvements, with the study group achieving a more substantial increase in quality of life scores ($P < 0.05$) (**Figure 3**).

Comparison of adverse event incidence

The incidence of adverse events was significantly lower in the study group compared to the control group ($P < 0.05$) (**Table 7**).

Comparison of renal function indicators

No significant difference in SCr and BUN levels was found between the groups before the intervention (both $P > 0.05$). Afterward, both groups experienced notable reductions in SCr and BUN levels, with the study group showing a greater improvement (both $P < 0.05$) (**Figure 4**).

Table 2. Comparison of postoperative pain duration (n)

Group	n	< 6 h	≥ 6 h
Control group	48	26	22
Study group	46	34	12
t	/	3.967	
P	/	0.046	

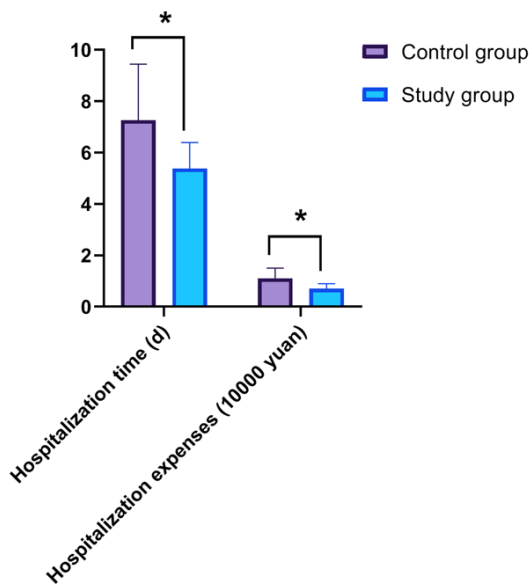


Figure 1. Comparison of hospitalization duration and hospitalization expenses. The study group exhibited shorter average length of hospital stays and lower hospitalization expenses compared to the control group. The asterisk (*P) denotes statistically significant differences ($P < 0.05$) compared with the control group.

compared to the control group ($P < 0.05$). The study group also exhibited shorter hospital stays and lower costs (both $P < 0.05$) (**Table 2**; **Figure 1**).

Comparison of pain relief rate

The study group showed a higher pain relief rate than the control group, with a significant difference ($P < 0.05$) (**Table 3**).

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Table 3. Comparison of pain relief (n)

Group	n	Significant relief	Effective relief	No relief
Control group	48	25	13	10
Study group	46	27	16	3
<i>t</i>	/		4.116	
<i>P</i>	/		< 0.001	

Table 4. Comparison of satisfaction (n)

Group	n	Very satisfied	Satisfied	Fair	Dissatisfied
Control group	48	24	10	5	9
Study group	46	27	12	4	3
<i>t</i>	/		3.428		
<i>P</i>	/		< 0.001		

Discussion

Urinary calculi frequently exacerbate patient pain, impair sleep quality, and elevate the risk of venous thrombosis [15]. Many patients, due to limited awareness, overlook their pain severity, leading to feelings of fear and anxiety [16]. Integrated nursing incorporating pain assessment, monitoring, medication management, catheter care, and dietary guidance, significantly reduces pain and enhances patient satisfaction [17]. Coupled with psychological interventions, this approach also alleviates patients' negative emotions, and is increasingly used in urological nursing [18, 19].

Urinary calculi are commonly associated with intense pain [20]. Pain is a pivotal indicator to assess patients' vital signs [21]. This research explored the impact of integrated nursing and psychological intervention on the pain intensity and relief in urinary calculi patients. The findings revealed that the study group, integrated comprehensive care and psychological support, had more patients with pain lasting less than 6 hours and fewer with pain over 6 hours compared to the control group. This indicates the effectiveness of the combined approach in substantially mitigating pain and thus it can meet patient needs more effectively. Personalized pain management improves patients' pain tolerance, cooperation, and motivation [22].

In this study, it was suggested that higher satisfaction levels were observed in the study group than in the control group, indicating that the combined approach more effectively fulfills patients' physical and psychological needs,

thereby enhancing their satisfaction with the nursing care provided. This augments the validation for healthcare practitioners and indicates the importance of integrated nursing combined with psychological intervention in improving nursing quality [23].

Furthermore, this study found significant improvements in the study group, as evidenced by lower NRS and PSQI scores compared to the control group. This indicates that integrated nursing combined with psychological intervention can effectively ameliorate pain and enhance sleep quality. Due to widespread neglect of urinary calculi, recurrent episodes are common, significantly contributing to patients' feelings of despair [24, 25].

Both groups saw significant reductions in SDS and SAS scores, with the study group showing more substantial decreases, indicating enhanced mental health outcomes through the combined nursing approach. Supporting these findings, previous research by Hang on emergency urinary calculi patients revealed similar improvements in pain, anxiety, and depression scores in the group receiving nursing intervention [26]. Moreover, the study group demonstrated significant improvements in quality of life post-intervention, underscoring the combined approach's benefit to overall patient health. The study suggests that nursing interventions, including educational guidance, emotional support, relaxation training, communication therapy, and psychological support, are vital in mitigating negative emotions and improving psychological adaptability in urinary calculi patients, which is similar to the reported analysis [27].

The analysis identified education level, marital status, and occupation as significant factors for urinary calculi. Higher-educated patients likely have better disease understanding and cooperation with treatment due to greater health consciousness. Married individuals may benefit from emotional and practical support from their spouses, aiding in stress relief and recovery. Occupational demands, exposure to harmful environments, or financial constraints due to the nature of one's job may also impact

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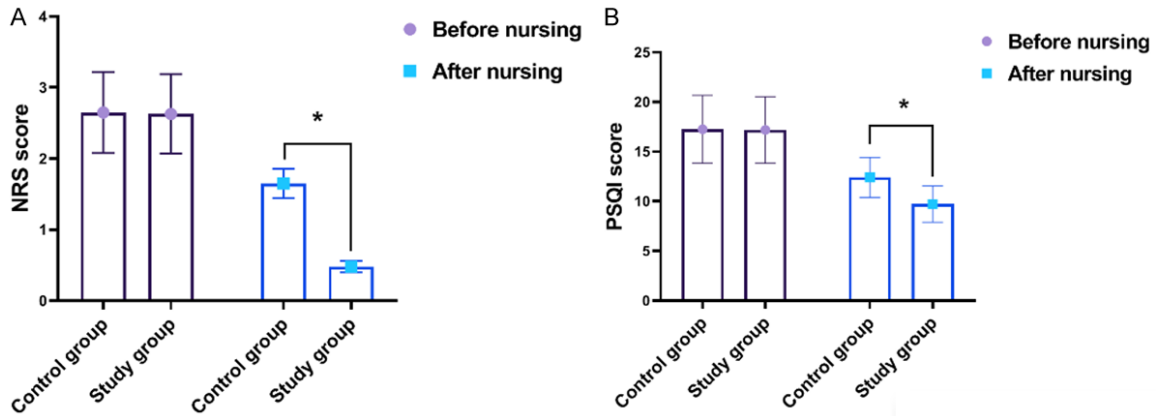


Figure 2. Comparison of NRS and PSQI scores between the two groups. The asterisk (*P) denotes a statistically significant difference in the NRS (A) and PSQI (B) scores between the two groups ($P < 0.05$). NRS: Numeric Rating Scale; PSQI: Pittsburgh Sleep Quality Index.

Table 5. Comparison of SDS and SAS scores (mean \pm SD)

Group	n	SDS		SAS	
		Before nursing	After nursing	Before nursing	After nursing
Control group	48	56.24 \pm 3.28	45.28 \pm 4.05	58.46 \pm 4.05	38.04 \pm 3.28
Study group	46	56.21 \pm 3.31	34.07 \pm 2.65	58.31 \pm 4.02	25.16 \pm 2.17
t	/	0.044	15.807	0.180	22.352
P	/	0.965	< 0.001	0.857	< 0.001

SDS: Self-rating Depression Scale; SAS: Self-rating Anxiety Scale.

Table 6. Analysis of related factors affecting prognosis of patients with urinary calculi (n)

Index		Good prognosis (n=63)	Poor prognosis (n=31)	t/ χ^2	P
Age	< 30 years	32	8	5.922	0.052
	30-50 years	18	11		
	> 50 years	13	12		
Gender	Male	40	21	0.091	0.763
	Female	23	10		
Educational level	Primary school	10	16	13.289	0.001
	Secondary school	34	10		
	College	19	5		
Marital status	Unmarried	23	11	3.361	0.186
	Married	38	16		
	Divorced	2	4		
Occupation	Worker	32	18	9.223	0.026
	Cadre	12	6		
	Self-employed	17	2		
	Unemployed	2	5		

the risk and recovery process of urinary calculi.

This study has a few areas of improvement. Firstly, the sample size and retrospective

nature may lead to non-representative results. Secondly, the nursing approach differed between the study group and the control group, which could influence other variables like stress levels or treatment outcomes. Thirdly, factors

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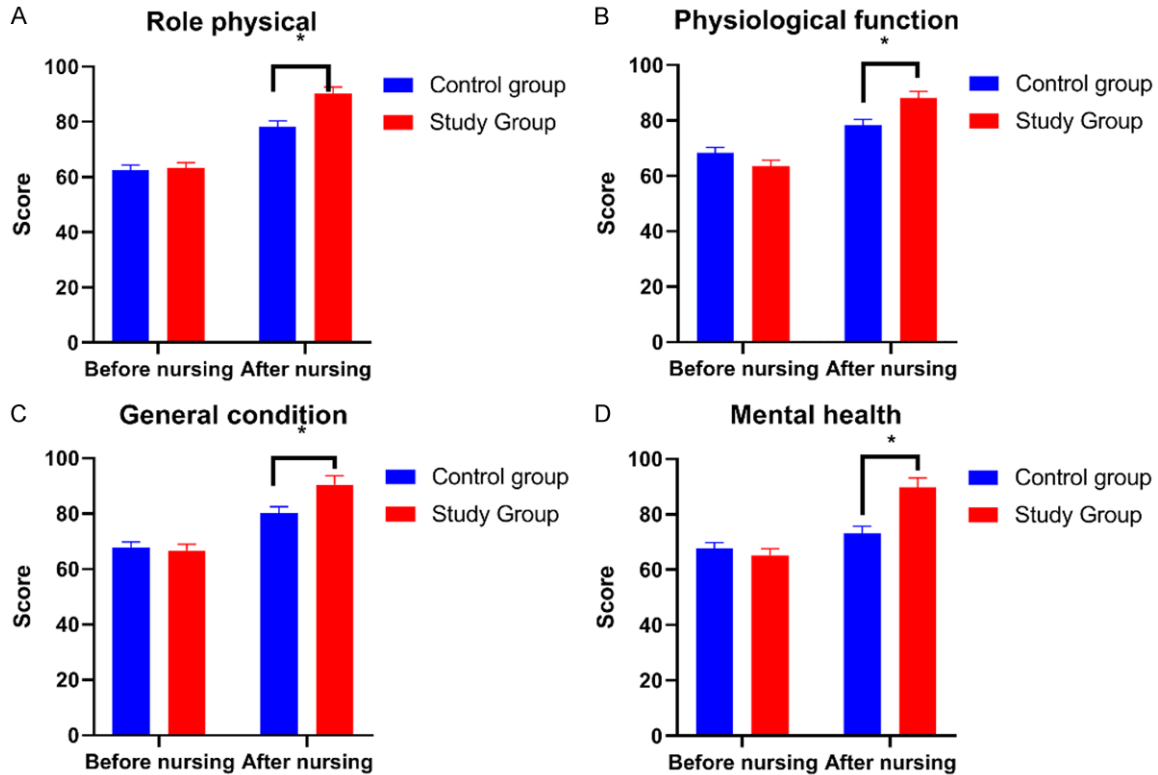


Figure 3. Comparison of quality of life scores between the two groups. The asterisk (*P) denotes a statistically significant difference in aspects of role physical (A), physiological function (B), general condition (C), and mental health (D) when compared between the groups ($P < 0.05$).

Table 7. Comparison of adverse event incidence (n, %)

Group	n	Renal extravasation	Urinary tract infection	Postoperative bleeding	Urine leakage	Incidence
Control group	48	1 (2.08)	3 (6.25)	1 (2.08)	2 (4.17)	7 (14.58)
Study group	46	0	1 (2.17)	0	0	1 (2.17)
t	/					4.646
P	/					0.031

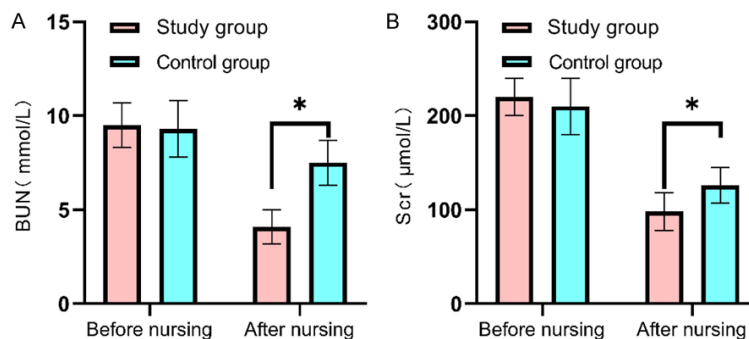


Figure 4. Comparison of renal function indicators between the two groups. The asterisk (*P) symbolizes a statistically significant difference in renal function indicators, BUN (A) and SCr (B) levels, between the two groups ($P < 0.05$). BUN: blood urea nitrogen; SCr: serum creatinine.

such as social support, lifestyle, and genetics which could affect pain intensity and nursing satisfaction were not fully considered.

In summary, integrated nursing and psychological intervention significantly impacts pain relief, emotional well-being, sleep quality, overall life quality, and patient satisfaction in urinary calculi care. This underscores the approach's relevance in clinical prac-

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tice, offering valuable insights for future research.

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Disclosure of conflict of interest

None.

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