

ORIGINAL RESEARCH ARTICLE

Effect of graded nursing and feeding guidance based on water swallow test combined with enteral nutrition support in juvenile dermatomyositis children with swallowing dysfunction

DOI: 10.29063/ajrh2025/v29i5s.14

Xiaohong Xi¹, Jingxia Wang¹, Chunzhen Li¹, Ling Liu¹, Shuokang Gong² and Peitong Han^{1*}

Department of Nephrology and Immunology, Children's Hospital of Hebei Province, Shijiazhuang, Hebei, 050000, China¹; Endoscopy Room, Children's Hospital of Hebei Province, Shijiazhuang, Hebei, 050000, China²

*For Correspondence: Email: xjnjn49799@163.com

Abstract

This study explored the effect of graded nursing and feeding guidance combined with enteral nutrition support in juvenile dermatomyositis children with swallowing dysfunction. Sixty-four juvenile dermatomyositis children with swallowing dysfunction admitted in Children's Hospital of Hebei Province from January 2022 to January 2023 were recruited as the study participants. They were randomly divided into an experimental group and a control group. The control group accepted routine nursing. The experimental group received graded nursing care, feeding guidance, enteral nutrition support, and routine nursing. After intervention, relative to the control group, the experimental group had better grade of water swallow test, higher total effectiveness rate, higher quality of life scores, higher levels of nutritional indexes and immune function indexes, lower incidence of complications and higher nursing satisfaction. We conclude that graded nursing, feeding guidance, and enteral nutrition support can improve the swallowing function, promote the nutritional status and immune function, along with decrease the incidence of complications in juvenile dermatomyositis children with swallowing dysfunction. (*Afr J Reprod Health* 2025; 29 [5s]: 112-120).

Keywords: Juvenile dermatomyositis, swallowing dysfunction, graded nursing, feeding guidance, water swallow test, enteral nutrition support

Résumé

Cette étude a exploré l'effet des soins infirmiers progressifs et des conseils nutritionnels associés à une nutrition entérale chez les enfants atteints de dermatomyosite juvénile présentant des troubles de la déglutition. Soixante-quatre enfants atteints de dermatomyosite juvénile présentant des troubles de la déglutition, admis à l'hôpital pour enfants de la province du Hebei entre janvier 2022 et janvier 2023, ont été recrutés comme participants à l'étude. Ils ont été répartis aléatoirement en un groupe expérimental et un groupe témoin. Le groupe témoin a accepté les soins infirmiers de routine. Le groupe expérimental a bénéficié de soins infirmiers progressifs, de conseils nutritionnels, d'une nutrition entérale et de soins infirmiers de routine. Après l'intervention, par rapport au groupe témoin, le groupe expérimental a obtenu une meilleure note au test de déglutition à l'eau, un taux d'efficacité globale plus élevé, des scores de qualité de vie plus élevés, des indices nutritionnels et immunitaires plus élevés, une incidence plus faible de complications et une plus grande satisfaction vis-à-vis des soins infirmiers. Nous concluons que les soins infirmiers progressifs, les conseils nutritionnels et la nutrition entérale peuvent améliorer la déglutition, favoriser l'état nutritionnel et la fonction immunitaire, et réduire l'incidence de complications chez les enfants atteints de dermatomyosite juvénile présentant des troubles de la déglutition. (*Afr J Reprod Health* 2025; 29 [5s]: 112-120).

Mots-clés: Dermatomyosite juvénile, troubles de la déglutition, soins infirmiers gradués, conseils d'alimentation, test de déglutition à l'eau, soutien nutritionnel entéral

Introduction

Juvenile dermatomyositis (JDM) belongs to an immune-mediated multi-system disease in childhood characterized by chronic non-suppurative inflammation of the striated muscle, skin, as well as the digestive tract.¹ This disease can

happen at any age, but age of onset is mostly 5-14 years old.² The disease is more common in girls as compared to boys, the proportion of men to women being 1:2.³

International epidemiological data has shown that the occurrence of JDM in children below 16 years of age is (2-5)/1,000,000.⁴ The

clinical characteristics of JDM are proximal limb muscle weakness along with a variety of rashes, which may be combined with respiratory, cardiovascular, digestive as well as nervous system involvement.⁵ Swallowing dysfunction is also a common clinical manifestation of JDM.⁶ If swallowing dysfunction is not relieved over a long period of time, it can result in malnutrition, dehydration, as well as electrolyte disturbance.⁷ The greatest risk of swallowing dysfunction is aspiration, which can lead to aspiration pneumonia. Currently, there is a general lack of understanding of the swallowing dysfunction in clinical practice, and swallowing function evaluation is usually only performed in neurology or rehabilitation departments.⁸ However, lacking assessment of swallowing dysfunction resulted by rheumatic immune diseases influences the rehabilitation of children with diseases to some extent. Early and timely measurement of swallowing dysfunction is a precondition for decreasing the risk of pulmonary complications.⁹

The water swallow test was proposed by Toshio Koda, a Japanese scholar.¹⁰ It has clear classification, simple operation and is suitable for clinical use as a routine assessment tool.¹¹ The test is now widely used in neurology and rehabilitation.¹² It has been applied to rheumatic immune diseases, and has proved that the water swallow test can easily and accurately evaluate the swallowing function of patients. It can be used as one of the routine evaluation contents in admission of children with JDM.¹³

Children with JDM with swallowing dysfunction can seriously affect the nutritional status of patients, and then affect the recovery of the disease.¹⁴ Therefore, it is very essential to give nutritional support to patients with JDM with swallowing dysfunction. Enteral nutrition support means that in the case of patients cannot obtain or insufficient intake, through the enteral supplement or provide necessary nutrition to maintain the human body, which has a vital role in the recovery of patients.¹⁵

In our study, we explored the effectiveness of graded nursing and feeding guidance based on the water swallow test combined with enteral nutrition support in children with JDM with swallowing dysfunction.

Methods

Materials

Sixty-four patients with JDM with swallowing dysfunction admitted in Children's Hospital of Hebei Province from January 2022 to January 2023 were recruited as study participants. The inclusion criteria were: (1) patients were in line with the diagnostic criteria for JDM; (2) volunteering to participate in the study; (3) patient was conscious and had no communication disorder.; (4) presence of dysphagia symptoms; and (5) age under 18 years old.

The exclusion criteria were: (1) patients with mental illness and could not cooperate well; (2) patients with severe heart, kidney and lung diseases, or malignant tumors; and (3) patients with dysphagia caused by other factors.

The patients were randomly divided into an experimental group (EG) and a control group (CG), and each group had 32 cases. The EG contained 15 boys and 17 girls, aged 3-14 years old, with a mean age of (10.23±3.24) years. The CG contained 15 boys and 17 girls, aged 2-15 years old, with a mean age of (10.36±3.32) years. There was statistically significant difference in socio-demographic characteristics between the two groups (P>0.05).

Methods

The CG was given routine nursing including drug guidance, psychological nursing, dietary nursing, health education and telephone follow-up after discharge.

In addition to routine nursing, the EG received graded nursing and feeding guidance based on the water swallow test combined with enteral nutrition support, as follows:

(1) Assessment of swallowing dysfunction: The swallowing dysfunction of the patients was evaluated by the water swallowing test scale proposed by Toshio Koda, a Japanese scholar.¹⁰ The patient took a seat and drank 30 ml warm water. The time required and cough condition were observed. Swallowing dysfunction was graded 1-5: Grade 1: patients could successfully swallow water once; Grade 2: Patients swallowed twice without coughing; Grade 3: Patients swallowed once, but

had a choking cough; Grade 4: Patients swallowed over 2 times, but had a choking cough; Grade 5: Patients coughed frequently and could not swallow all the water. The higher score represented more severe swallowing dysfunction: (2) Graded nursing: (a) Mild dysphagia (Grade 1-2): Nurses asked patients to watch health education videos for dysphagia provided by our hospital, including disease knowledge, postoperative rehabilitation process, precautions, dietary principles, and nutrition collocation methods. The nurse instructed the patient to carry out the training of empty pharynx and swallowing water every morning and evening. Patients could eat liquid food, semi-liquid food, including noodles, rice porridge, milk and other nutrient-rich and soft food, eating attention to small chewing, soup and rice. Patients were accompanied by family members or nurses during the feeding process in order to timely treatment of cough, reflux and other conditions. Patients adhered to the principle of eating small meals and gargling with warm water after eating. Nurses asked the patient to pay attention to swallow carefully when drinking water. (b) Moderate dysphagia (Grade 3): In acute stage, patients were placed gastric tube for nasal feeding nutrition support. After the patient's vital signs were stable, the patient was given liquid or paste food, including 4 ml of liquid food such as mung bean soup and milk.

If the patient had no cough, reflux and other reactions, the intake of 4 mL each time could continue to eat for about half an hour. If coughing or regurgitation occurred, the intake was reduced to 2 mL each time. When the patient could successfully swallow liquid food without choking and regurgitation, patients could try to swallow mushy food. During the eating process, the nurse observed the patient for symptoms such as nausea and suffocation. If any abnormality is found, stop eating immediately and the nurse adjusts the diet plan (to a liquid diet). (c) Severe dysphagic disorder (Grade 4-5): Patients were fed nasogastric with indentation of gastric tube, with an initial dose of 200 mL. After continuous nasogastric feeding for 3 days without adverse reactions, the dose of single nasogastric nutrient solution could be appropriately increased, and the amount of nutrient solution could be adjusted following the patient's condition in the later stage. (3) Feeding guidance: (a) Body position.

Patients with Grade 5 were supported by raising the head of the bed to take a semi-seated position or seated eating. The bedridden patient was placed in an inclined position. The nurse raised the head of the bed by 30°~60° and tilted the head forward. For patients with Grade 3-4, the nurse assisted the patient with turning the head to one side while eating, preventing food from spilling, and controlling the speed of eating and the amount of each feeding. For patients with Grade 1-2, the nurse assisted the patient with turning the head to one side while eating. (b) Food choices. The form of food was selected on the basis of the patient's specific situation along with the degree of swallowing dysfunction, with the principle of first easy and then difficult, following a pattern from concentrated liquid to paste to semi-solid to solid.

Generally, advanced food paste or concentrated liquid diet was not used alone, which was easy to cause coughing warm water or soup. With the recovery of swallowing function and the stability of the disease, semi-solid food was gradually given, and semi-solid food was selected with uniform density, appropriate viscosity, and needed to be chewed, such as thick mashed potatoes, vegetable mud, fruit mud, and rotten noodles. In addition, the nurse paid attention to the color, aroma, taste and temperature of the food, and chose food types according to the patient's preferences, which was conducive to increasing the patient's appetite. When the nurse guided the patient to eat, tried to send the food to the pharynx to prevent overflow. At the beginning of feeding, each intake started from 3-5 ml and gradually increased to the normal amount (20 mL). If the amount is too much, it may cause mis swallow, and if the amount is too small, the intensity of stimulation is insufficient, it may make the swallowing reflex difficult to produce. (c) The patient didn't lie down immediately after eating, and the nurse helped the patient to take a semi-seated position. The patient had no vigorous activity within 2 hours after eating, and the bedridden patient could not move freely. The nurse closely observed the patient for severe cough, food reflux, and aspiration. (4) Enteral nutrition support: The patient was placed with nasogastric tube and injected with enteral nutrient suspension (Nuditia Pharmaceutical (Wuxi) Co., LTD., 0.75 kcal/mL).

On the first day, the enteral nutrition pump was administered at a rate of 25 mL/h and increased to 25 ~ 30 kcal/kg/d within 3 days. Gastric residue was detected every 8 hours during treatment, and the pumping rate was adjusted according to the gastric residue and patient tolerance. The patients were treated for 2 weeks.

Observed indicators

(1) The grade of the water swallow test and clinical effect were compared between the two groups. Evaluation criteria of curative effect: (1) Grade I was assessed in the water swallow test, indicating recovery; (2) The grade of water swallow test was increased by 2 levels, indicating obvious effect; (3) The grade of water swallow test was increased by 1 level, indicating effective; (4) There was no change in the grade of water swallow test, indicating ineffective. Total effective rate = (recovery + obvious effect + effective)/ total cases × 100%.

(2) M. D. Anderson Dysphagia Inventory (MDADI) was used for evaluating the quality of life,¹⁶ including general condition (1 item), emotion (6 items), function (5 items) and physiology (8 items). A 5-level scoring method was adopted, with the score ranging 0-100 points. The higher the score, the better the quality of life was.

(3) The levels of nutritional indexes were compared between both groups. 3 mL fasting venous blood was collected from the patients, centrifuged (3 500 r·min⁻¹, 15 min), and serum was collected. The hemoglobin (Hb) level was determined by automatic blood cell analyzer. Albumin (ALB) levels were measured using a fully automated biochemical analyzer.

(4) Serum levels of immunoglobulin (Ig) G, IgA and IgM were detected by automatic biochemical analyzer.

(5) Incidence of complications including aspiration, pulmonary infection, and asphyxia was recorded.

(6) The nursing satisfaction of patients was compared. The nursing satisfaction questionnaire designed by our hospital was used to measure the nursing satisfaction. The total score of the questionnaire was 100 points. 90 ~ 100 was very satisfied, 70 ~ 89 was satisfied, and 0 ~ 69 was dissatisfied. Satisfaction = (very satisfied + satisfied) Number of cases/total cases × 100%.

Statistical analysis

SPSS 24.0 statistical software was adopted for data analysis. Measurement data were exhibited as ($\bar{x} \pm s$), and t-test was adopted for comparison. Count data were expressed as (n, %), and χ^2 test was implemented for comparison. $P < 0.05$ meant the difference was statistical significance.

Ethical consideration

This study was consistent with the ethical standards of the 1964 Declaration of Helsinki and its later amendments, and was approved by the Ethics Committee of Children's Hospital of Hebei Province on May 16, 2021, and the Ethical approval number was 202136. The patient's parents signed an informed consent form.

Results

Grade of the water swallow test and clinical effect in 2 groups

Prior to the intervention, there was no statistically significant difference in the grade of water swallow test between the two groups ($P > 0.05$). After intervention, the grade of water swallow test in the EG was better than that in the CG ($P < 0.05$, Table 1). As shown in Table 2, relative to the CG, the EG had higher total effectiveness rate ($P < 0.05$).

Quality of life in the two groups

Prior to intervention, no difference was shown in MDADI scores in all dimensions between both groups ($P > 0.05$). After intervention, the MDADI scores in all dimensions were elevated in both groups. However, relative to the CG, the EG had higher MDADI scores in all dimensions ($P < 0.05$, Figure 1).

Levels of nutritional indices in the two n 2 groups

Prior to intervention, no difference was shown in levels of nutritional indices between both groups ($P > 0.05$). After intervention, the levels of nutritional indices were elevated in the two groups. However, relative to the CG, the EG had higher levels of nutritional indexes ($P < 0.05$, Figure 2).

Table 1: Grade of water swallow test in the two groups

Grade	Control group (n=32)		Experimental group (n=32)	
	Before intervention	After intervention	Before intervention	After intervention
Grade I	0 (0.0%)	6 (18.8%)	0 (0.0%)	13 (40.6%)
Grade II	6 (18.8%)	8 (25.0%)	5 (15.6%)	13 (40.6%)
Grade III	18 (56.2%)	13 (40.6%)	17 (53.1%)	5 (15.6%)
Grade IV	3 (9.4%)	2 (6.2%)	4 (12.5%)	1 (3.2%)
Grade V	5 (15.6%)	3 (9.4%)	6 (18.8%)	0 (0.0%)
χ^2	0.4	10.7		
P	1.0	0.0		

Table 2: Clinical effect of the water swallow test

Groups	Cases	Recovery	Obvious effect	Effective	Ineffective	Total effective rate
Control group	32	10	8	5	9	23 (71.9%)
Experimental group	32	15	9	6	2	30 (93.8%)
χ^2						3.9
P						0.0

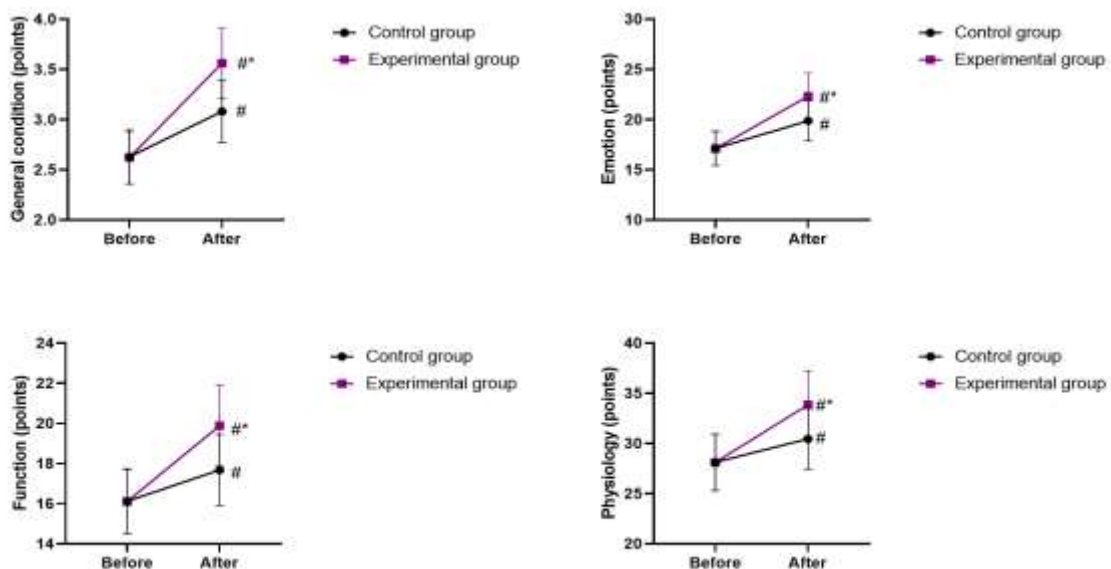


Figure 1: Quality of life in 2 groups. #P<0.05, compared with before intervention. *P<0.05, compared with CG

Immune function in the two groups

Prior to intervention, no difference was discovered in levels of immune function indexes between both groups (P>0.05). After intervention, the levels of immune function indexes were elevated in the two groups. However, relative to the CG, the EG had higher levels of immune function indexes (P<0.05, Figure 3).

Incidence of complications in 2 groups

Table 3 indicate that the incidence of complications in the EG was lower as relative to the CG (P<0.05).

Nursing satisfaction in 2 groups

Table 4 displayed that relative to the CG, the EG had better nursing satisfaction (P<0.05).

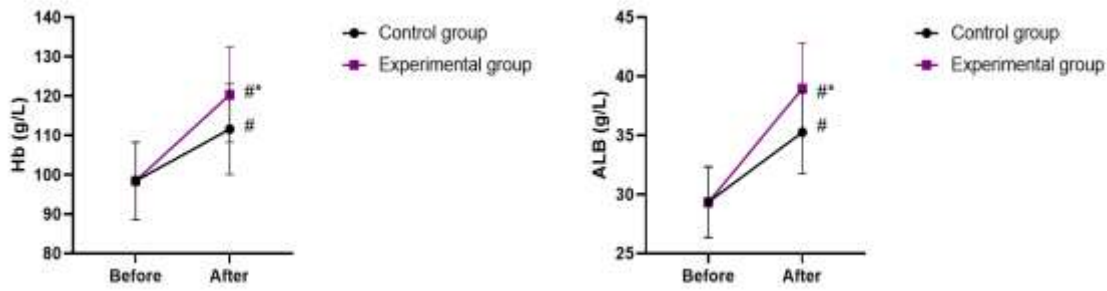


Figure 2: Levels of nutritional indexes in 2 groups. #P<0.05, compared with before intervention. *P<0.05, compared with CG

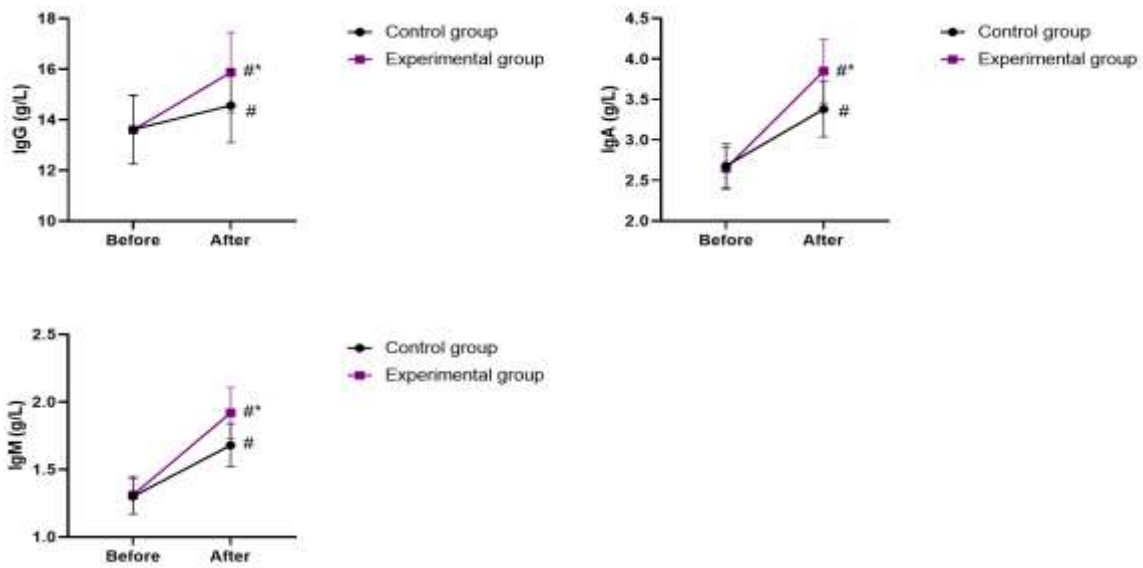


Figure 3: Immune function in 2 groups. #P<0.05, compared with before intervention. *P<0.05, compared with CG

Table 3: Incidence of complications in 2 groups

Groups	Cases	Aspiration	Pulmonary infection	Asphyxia	Total incidence rate
Control group	32	2	3	2	7 (21.9%)
Experimental group	32	0	1	0	1 (3.1%)
χ^2					5.1
P					0.0

Table 4: Nursing satisfaction in 2 groups

Groups	Cases	Very satisfied	Satisfied	Dissatisfied	Total satisfaction rate
Control group	32	13	10	9	23 (71.9%)
Experimental group	32	16	14	2	30 (93.8%)
χ^2					3.9
P					0.0

Discussion

Swallowing dysfunction is an important factor affecting the quality of life of children with JDM, and increases the risk of feeding aspiration.¹⁷ For patients with swallowing difficulties, coughing and other problems will make patients afraid of eating, resulting in insufficient intake of nutrients, malnutrition, hypoproteinemia and other consequences.¹⁸ The rehabilitation of swallowing function in polymyositis patients is a long-term process, and routine nursing only provides basic feeding guidance during hospitalization, lacking accurate consistency assessment and corresponding food guidance.¹⁹ Studies have shown that in the absence of treatment and guidance from professional therapists, patients often have complications related to swallowing and devolution of swallowing function due to long-term blind catheterization or incorrect feeding methods, which seriously affect the physiology, psychology, and prognosis of patients with swallowing disorders.²⁰

The simple and easy water swallow test has a high sensitivity for the screening of swallowing function in JDM patients.²¹ The test divides the speed of drinking water and the degree of coughing of patients into five levels, if the result is grade I to II, give dietary guidance, you can eat orally.²² If the result is grade III to V, the nasogastric tube should be placed and the tube feeding diet should be given following the doctor's advice.²³ The implementation of targeted nursing measures based on the grading of patients with swallowing disorders as well as feeding guidance can effectively reduce the consumption of nursing resources, and ensure that patients eat a reasonable diet to avoid the occurrence of adverse conditions such as coughing and vomiting caused by improper eating.²⁴

When swallowing dysfunction occurs in patients, it will affect the intake of food by patients, thus affecting the absorption of nutrients by patients.²⁵ Some patients may also have unnecessary accidents due to aspiration, causing other complications and seriously affecting patients' quality of life.²⁶ Hence, it is crucial to provide patients with an effective nutritional

support nursing intervention, by establishing enteral nutrition channels, to give patients adequate nutritional support.²⁷ Clinical studies have shown that the implementation of enteral nutrition support for patients can effectively improve the nutritional level of patients.²⁸ The enteral nutrient suspension used in our study is a high energy nutrient ingredient, which contains a variety of nutrients. Each 500 ml contains 58 g/L of fat, 56 g/L of protein, 188 g/L of carbohydrates, and 750 KCal of calories, which can effectively improve the state of nutrition of patients.²⁹

In our study, the outcomes indicated that after intervention, relative to the CG, the EG had better grade of water swallow, higher total effective rate, and higher MDADI scores in all dimensions, suggesting that graded nursing and feeding guidance based on the water swallow test in combination with enteral nutrition support could effectively improve the swallowing function along with promote the quality of life of children with JDM with swallowing dysfunction, which was consistent with previous studies.^{30,31}

Our study also indicated that after intervention, relative to the CG, the EG had higher levels of nutritional indexes and immune function indexes, lower incidence of complications, and higher nursing satisfaction, reflecting that graded nursing and feeding guidance based on the water swallow test in combination with enteral nutrition support could effectively promote nutritional status and immune function, as well as decline the incidence of complications of children with JDM with swallowing dysfunction, thereby promoting the nursing satisfaction of children's family members, which was basically in accordance with previous studies.^{32,33}

Strengths and limitations

Strengths of the study were that it was a sham-controlled clinical trial that included multiple measures related to swallowing function. Limitations include being a single-center study and reliance on patient reporting to evaluate satisfaction. Our study might provide a clinical nursing reference for children with JDM with swallowing dysfunction.

Conclusion

Graded nursing and feeding guidance based on the water swallow test combined with enteral nutrition support can improve the swallowing function, promote the nutritional status and immune function, as well as decrease the incidence of complications of children with JDM with swallowing dysfunction.

Competing interests

The authors report no actual or potential conflicts of interest.

Acknowledgement

This work was supported by the Application study of graded nursing and dietary guidance in nursing of children with juvenile dermatomyositis and swallowing dysfunction (No. 20220044).

Contribution of authors

Xiaohong Xi and Jingxia Wang: conceived and designed the study. Chunzhen Li and Ling Liu: collected and analysed the data. Shuokang Gong and Peitong Han: prepared the manuscript. All authors mentioned in the article approved the manuscript.

References

- Li D and Tansley SL. Juvenile Dermatomyositis-Clinical Phenotypes. *Curr Rheumatol Rep*. 2019; 21(12): 74.
- McCann LJ, Livermore P, Wilkinson MGL and Wedderburn LR. Juvenile dermatomyositis. Where are we now? *Clin Exp Rheumatol*. 2022; 40(2): 394-403.
- Leung AKC, Lam JM, Alobaida S, Leong KF and Wong AHC. Juvenile Dermatomyositis: Advances in Pathogenesis, Assessment, and Management. *Curr Pediatr Rev*. 2021; 17(4): 273-287.
- DeWane ME, Waldman R and Lu J. Dermatomyositis: Clinical features and pathogenesis. *J Am Acad Dermatol*. 2020; 82(2): 267-281.
- Wu JQ, Lu MP and Reed AM. Juvenile dermatomyositis: advances in clinical presentation, myositis-specific antibodies and treatment. *World J Pediatr*. 2020; 16(1): 31-43.
- Kim SJ, Han TR, Jeong SJ and Beom JW. Comparison between swallowing-related and limb muscle involvement in dermatomyositis patients. *Scand J Rheumatol*. 2010; 39(4): 336-340.
- McCann LJ, Garay SM, Ryan MM, Harris R, Riley P and Pilkington CA. Oropharyngeal dysphagia in juvenile dermatomyositis (JDM): an evaluation of videofluoroscopy swallow study (VFSS) changes in relation to clinical symptoms and objective muscle scores. *Rheumatology (Oxford)*. 2007; 46(8): 1363-1366.
- Panebianco M, Marchese-Ragona R, Masiero S and Restivo DA. Dysphagia in neurological diseases: a literature review. *Neurol Sci*. 2020; 41(11): 3067-3073.
- Tutor JD, Srinivasan S, Gosa MM, Spentzas T and Stokes DC. Pulmonary function in infants with swallowing dysfunction. *PLoS One*. 2015; 10(5): e0123125.
- Brodsky MB, Suiter DM, González-Fernández M, Michtalik HJ, Frymark TB, Venediktov R and Schooling T. Screening Accuracy for Aspiration Using Bedside Water Swallow Tests: A Systematic Review and Meta-Analysis. *Chest*. 2016; 150(1): 148-163.
- Kuuskoski J, Vanhatalo J, Rekola J, Aaltonen LM and Järvenpää P. The Water Swallow Test and EAT-10 as Screening Tools for Referral to Videofluoroscopy. *Laryngoscope*. 2023
- Donohue C, Tabor Gray L, Chapin J, Anderson A, DiBiase L, Wymer JP and Plowman EK. Discriminant ability of the 3-ounce water swallow test to detect aspiration in amyotrophic lateral sclerosis. *Neurogastroenterol Motil*. 2022; 34(7): e14310.
- Chen PC, Chuang CH, Leong CP, Guo SE and Hsin YJ. Systematic review and meta-analysis of the diagnostic accuracy of the water swallow test for screening aspiration in stroke patients. *J Adv Nurs*. 2016; 72(11): 2575-2586.
- Willig TN, Paulus J, Lacau Saint Guily J, Béon C and Navarro J. Swallowing problems in neuromuscular disorders. *Arch Phys Med Rehabil*. 1994; 75(11): 1175-1181.
- Allen K and Hoffman L. Enteral Nutrition in the Mechanically Ventilated Patient. *Nutr Clin Pract*. 2019; 34(4): 540-557.
- Matsuda Y, Kanazawa M, Komagamine Y, Yamashiro M, Akifusa S and Minakuchi S. Reliability and Validity of the MD Anderson Dysphagia Inventory Among Japanese Patients. *Dysphagia*. 2018; 33(1): 123-132.
- Mugii N, Hasegawa M, Matsushita T, Hamaguchi Y, Oohata S, Okita H, Yahata T, Someya F, Inoue K, Murono S, Fujimoto M and Takehara K. Oropharyngeal Dysphagia in Dermatomyositis: Associations with Clinical and Laboratory Features Including Autoantibodies. *PLoS One*. 2016; 11(5): e0154746.
- Lawlor CM and Choi S. Diagnosis and Management of Pediatric Dysphagia: A Review. *JAMA Otolaryngol Head Neck Surg*. 2020; 146(2): 183-191.
- Ai D, Gu Y and Xu S. Effectiveness of Multidisciplinary Nursing Based on Fever, Blood Sugar, and Swallowing Function Management in Patients with

- Acute Stroke. *Evid Based Complement Alternat Med.* 2022; 20225949760.
20. Ren X, Huang L, Wang J, He J, Bai X and He Y. Efficacy of systematic voice training combined with swallowing function exercises for the prevention of swallowing dysfunction in stroke patients: a retrospective study. *Ann Transl Med.* 2022; 10(4): 195.
 21. Sarve AR, Krishnamurthy R and Balasubramaniam RK. The timed water test of swallowing: Reliability, validity, and normative data from Indian population. *Int J Health Sci (Qassim).* 2021; 15(2): 14-20.
 22. Osawa A, Maeshima S and Tanahashi N. Water-swallowing test: screening for aspiration in stroke patients. *Cerebrovasc Dis.* 2013; 35(3): 276-281.
 23. Yoshimatsu Y, Tobino K, Sueyasu T, Nishizawa S, Goto Y, Murakami K, Munechika M, Yoshimine K and Miyajima H. Repetitive saliva swallowing test and water swallowing test may identify a COPD phenotype at high risk of exacerbation. *Clin Respir J.* 2019; 13(5): 321-327.
 24. Wu C, Zhang K, Ye J, Huang X, Yang H, Yuan L, Wang H, Wang T, Zhong X, Guo J, Yu L and Xiao A. Evaluating the effectiveness of stepwise swallowing training on dysphagia in patients with Alzheimer's disease: study protocol for a randomized controlled trial. *Trials.* 2022; 23(1): 490.
 25. Kristensen MB, Isenring E and Brown B. Nutrition and swallowing therapy strategies for patients with head and neck cancer. *Nutrition.* 2020; 69110548.
 26. Umamoto G and Furuya H. Management of Dysphagia in Patients with Parkinson's Disease and Related Disorders. *Intern Med.* 2020; 59(1): 7-14.
 27. Burgos R, Bretón I, Cereda E, Desport JC, Dziewas R, Genton L, Gomes F, Jesús P, Leischker A, Muscaritoli M, Poulia KA, Preiser JC, Van der Marck M, Wirth R, Singer P and Bischoff SC. ESPEN guideline clinical nutrition in neurology. *Clin Nutr.* 2018; 37(1): 354-396.
 28. Ojo O and Brooke J. The Use of Enteral Nutrition in the Management of Stroke. *Nutrients.* 2016; 8(12):
 29. Li YX, Pan SH, Zeng JB, Yu K, Sun Q, Liu QY, Qin W, Zhang Q, Pan QR, Yu JC, Xu T, Han SM and Wang H. [The effect of enteral nutritional suspension (diabetes) (TPF-DM) on blood glucose, serum insulin and lipids in patients with type 2 diabetes]. *Zhonghua Nei Ke Za Zhi.* 2007; 46(3): 193-196.
 30. Güleç A, Albayrak I, Erdur Ö, Öztürk K and Levendoglu F. Effect of swallowing rehabilitation using traditional therapy, kinesiology taping and neuromuscular electrical stimulation on dysphagia in post-stroke patients: A randomized clinical trial. *Clin Neurol Neurosurg.* 2021; 211107020.
 31. Juan W, Zhen H, Yan-Ying F, Hui-Xian Y, Tao Z, Pei-Fen G and Jian-Tian H. A Comparative Study of Two Tube Feeding Methods in Patients with Dysphagia After Stroke: A Randomized Controlled Trial. *J Stroke Cerebrovasc Dis.* 2020; 29(3): 104602.
 32. Wang F, Hou MX, Wu XL, Bao LD and Dong PD. Impact of enteral nutrition on postoperative immune function and nutritional status. *Genet Mol Res.* 2015; 14(2): 6065-6072.
 33. Ye J, Wu C, Chen J, Wang H, Pan Y, Huang X, Wu J, Zhong X, Zhou H, Wang W, Wu S, Zhou T, Wang L, Lu P, Ruan C, Guo J, Ning Y and Xiao A. Effectiveness of nurse-delivered stepwise swallowing training on dysphagia in patients with Alzheimer's disease: A multi-center randomized controlled trial. *Int J Nurs Stud.* 2023; 150104649.