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Comparison of Paraffin Oil Versus Lactulose in Children with Functional Constipation

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Declaration
Authors' Contribution
Dr. Abdul Hadi, PGR Pediatrics, LRH MTI Peshawar, took the lead in study design, manuscript drafting, and hospital data collection.
Dr. Afzal Khan, Associate Professor Pediatrics, LRH MTI Peshawar, provided supervision, contributed to study conceptualization, and guided manuscript development.
Dr. Muhammad Nabi, PGR Pediatrics, LRH MTI Peshawar, assisted in data analysis and interpretation, as well as manuscript revision.

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ABSTRACT

Background: Functional constipation is a common pediatric condition that significantly impacts quality of life. Various laxatives including paraffin oil and lactulose are used for treatment, but comparative efficacy in different demographic groups remains underexplored, especially in resource-limited settings. **Objective:** To compare the efficacy of paraffin oil and lactulose in children with functional constipation. **Study Design:** Randomized controlled trial. **Duration and Place of Study:** Conducted from February 2024 to August 2024 at the Department of Pediatrics, Lady Reading Hospital, Peshawar. **Methodology:** Sixty children with functional constipation were randomized into two groups of 30 each. Group A received oral paraffin oil, and Group B received oral lactulose, both administered twice daily for eight weeks. Treatment efficacy was assessed based on stool frequency and encopresis episodes recorded by parents during follow-ups at four and eight weeks. **Results:** Baseline demographics were comparable between groups. Overall efficacy was significantly higher in the paraffin oil group (83.3%) compared to the lactulose group (56.7%) (p=0.047). Stratified analysis revealed paraffin oil's superior efficacy in younger children (≤6 years), females, and lower socioeconomic and educational backgrounds. **Conclusion:** Paraffin oil is more effective than lactulose for treating functional constipation in children, particularly in younger age groups and socioeconomically disadvantaged populations, making it a preferred treatment option in similar clinical settings.

INTRODUCTION

Functional constipation is a generalizable condition of the gastrointestinal system among children, characterized by infrequent defecation, hard feces, and defecation difficulty in the absence of underlying organic disease.[1] Functional constipation among children is defined as the occurrence of two specific symptoms for at least a month among children aged less than four years and for at least two months among children aged four and above based on the Rome IV criteria.[2] The symptoms include less than two defecations per week, retention of feces, painful defecation, presence of large fecal mass in the rectum, and large-diameter feces with the capacity to block the toilet.[3]

Treatment for pediatric functional constipation involves three main steps: emptying the bowels, keeping stools soft and modifying behaviors.[4] Disimpaction is performed on impacted feces and afterward, the use of laxatives is recommended to keep new impactions from occurring.[5] Pediatricians encourage parents to increase their child's fiber intake and to ensure proper fluid consumption, along with regular trips to the bathroom after food.[6] Depending on how serious the disease is, the patient's age and the results from past treatments, doctors may use osmotic, stimulant or lubricant laxatives.[7]

Paraffin oil, mineral oil, or liquid paraffin, is a laxative lubricant that functions through the coating of the intestinal walls and the stool, softening the stool and promoting easy movement.[2] The drug is not absorbed within the gastrointestinal tract and solely functions as a mechanical laxative.[8] Usual dosages are 1-3 mL/kg/day

and are typically given once daily or in divided doses.[9] Paraffin oil is highly effective for disimpaction and for the use in children's maintenance, and studies establish effectiveness in producing normal bowel movement.[10] Its side effects include lipoid pneumonia in the case of aspiration (most importantly in children less than a year old), leakage through the anus, and interference in the absorption of fat-soluble vitamins with long-term use.[11]

Lactulose is a synthetic disaccharide laxative with osmotic action that functions to draw water into the colon lumen and induce colonic bacterial fermentation and the production of short-chain fatty acids, further enhancing water retention and peristalsis stimulation.[12] The recommended dose is the usual initial dose of 1-2 mL/kg/day in children, with dose adjustment according to response and tolerance.[8] Lactulose has proven to be effective in the management of children with functional constipation with a good safety profile.[13] Side effects arise in the form of flatulence, cramping, and diarrhea, mostly during the initial treatment days.[13] Lactulose poses no danger of aspiration pneumonia and has no interference with vitamin absorption and is therefore safe for prolonged use.[12] Lactulose is metabolized in the colon and has no systemic absorbed, contributing to its safety profile in pediatric populations.[14]

A research conducted by Farahmand F and colleagues demonstrated that paraffin oil achieved a 90% effectiveness rate in treating children with functional constipation, whereas lactulose showed only a 52% success rate.[15]

Examining how paraffin oil and lactulose treat functional constipation in children is important for the Peshawar population since children in the area commonly face gastrointestinal concerns. There is a lack of advanced pediatric care here and treatments can cause different results. This emphasizes the importance of finding the most suitable, safe and cost-effective therapy. The purpose of this study is to create evidence-based advice for Peshawar's medical community, helping to increase the success of treatment and well-being of ill children.

METHODOLOGY

This randomized controlled trial was conducted between February 2024 and August 2024 in the Department of Pediatrics at LRH Peshawar. A total of 60 children aged 2 to 12 years diagnosed with functional constipation were enrolled. Functional constipation was identified when a patient exhibited at least two of the following symptoms for a duration of three months: fewer than three bowel movements per week, fecal soiling more than once weekly, passage of large stool amounts every 7–30 days, or a palpable abdominal or rectal fecal mass. Patients with a history of Hirschsprung's disease, spina bifida occulta, hypothyroidism, cystic fibrosis, neurological abnormalities, or intestinal pseudo-obstruction were excluded from the study.

Participants were selected through a non-probability consecutive sampling technique after obtaining ethical approval and informed consent from their parents. Demographic data including age, gender, constipation duration, weight, parents' educational level, socioeconomic status, profession, and residential status were recorded. Randomization into two groups was performed using block randomization; Group A received paraffin oil and Group B received lactulose, each consisting of 30 patients. Both treatments were administered orally at a dose of 1 to 2 ml/kg twice daily for eight weeks. Parents were instructed to adjust the dosage by 25% every three days as needed to achieve one or two soft stools daily. Additionally, dietary fiber intake was encouraged to be increased to a daily gram amount equal to the child's age plus ten.

To promote treatment adherence, toilet training sessions of five minutes after each meal were recommended. Parents maintained stool frequency and encopresis episode logs using a provided chart, which were reviewed during follow-up visits at four and eight weeks. Treatment efficacy was defined as achieving three or more bowel movements per week alongside encopresis episodes occurring less frequently than once every two weeks, based on parental reporting during follow-ups. Data were documented in a specifically designed proforma.

Statistical analysis was carried out using IBM SPSS version 26. Quantitative variables such were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. The chi-square test was applied to compare efficacy between groups, with a significance level set at $p \leq 0.05$. Further stratification of efficacy results was performed followed by chi-square testing to identify significant differences.

RESULTS

The study compared paraffin oil (Group A, n=30) versus lactulose (Group B, n=30) in children with functional constipation, with both groups showing similar baseline demographics (Table-I). The mean age was 6.53±3.07 years for paraffin oil and 6.73±3.10 years for lactulose groups, with mean weights of 23.30±8.26 kg and 23.97±8.64 kg respectively. Duration of constipation was 7.17±4.04 months in the paraffin oil group and 10.80±6.54 months in the lactulose group. Gender distribution was identical with 23 males (76.7%) and 7 females (23.3%) in each group. Parent education levels varied from uneducated (26.7% vs 30.0%), primary (33.3% vs 23.3%), secondary (23.3% vs 26.7%), to higher education (16.7% vs 20.0%). Socioeconomic status showed poor families comprising 46.7% vs 43.3%, middle class 33.3% vs 30.0%, and rich families 20.0% vs 26.7%. Professional status included jobless parents (56.7% vs 53.3%), employed (20.0% vs 30.0%), and business owners (23.3% vs 16.7%). Residential distribution showed rural residence in 53.3% vs 43.3% and urban residence in 46.7% vs 56.7% of cases respectively.

Table I

Demographics of the patients (n=60)

Demographics		Group A n=30 Mean±SD	Group B n=30 Mean±SD
Age (years)		6.53±3.07	6.73±3.10
Weight (kg)		23.30±8.26	23.97±8.64
Duration (months)		7.17±4.04	10.80±6.54
Gender	Male n(%)	23 (76.7%)	23 (76.7%)

	Female n(%)	7 (23.3%)	7 (23.3%)
Parent Education	Uneducated n(%)	8 (26.7%)	9 (30.0%)
	Primary n(%)	10 (33.3%)	7 (23.3%)
	Secondary n(%)	7 (23.3%)	8 (26.7%)
	Higher n(%)	5 (16.7%)	6 (20.0%)
Socioeconomic Status	Poor n(%)	14 (46.7%)	13 (43.3%)
	Middle n(%)	10 (33.3%)	9 (30.0%)
	Rich n(%)	6 (20.0%)	8 (26.7%)
Profession	Job n(%)	6 (20.0%)	9 (30.0%)
	Jobless n(%)	17 (56.7%)	16 (53.3%)
	Business n(%)	7 (23.3%)	5 (16.7%)
Residential Status	Rural n(%)	16 (53.3%)	13 (43.3%)
	Urban n(%)	14 (46.7%)	17 (56.7%)

Efficacy analysis revealed significantly superior results for paraffin oil compared to lactulose, with 25 patients (83.3%) showing efficacy in the paraffin oil group versus only 17 patients (56.7%) in the lactulose group (p=0.047, Fischer Exact Test) (Table-II).

Table II

Comparison of efficacy between the two groups n=60

Efficacy	Paraffin Oil n (%)	Lactulose n (%)	P value
Yes	25 (83.3%)	17 (56.7%)	0.047*
No	5 (16.7%)	13 (43.3%)	
Total	30 (100%)	30 (100%)	

***Fischer Exact Test**

Stratified analysis of efficacy by demographic variables demonstrated significant associations across multiple parameters (Table-III). Age stratification showed paraffin oil effectiveness in 13/16 children ≤6 years (81.3%) compared to only 3/16 with lactulose (18.8%) (p<0.001), while in children >6 years, paraffin oil achieved 12/14 efficacy (85.7%) versus 14/14 with lactulose (100.0%) (p<0.001). Gender analysis revealed paraffin oil efficacy in 18/23 males (78.3%) versus 15/23 with lactulose (65.2%) (p=0.407), and notably, all 7 females responded to paraffin oil (100.0%) compared to only 2/7 with lactulose (28.6%) (p=0.007). Weight-based analysis showed paraffin oil effectiveness in 12/15 children ≤20 kg (80.0%) versus 2/15 with lactulose (13.3%) (p<0.001), and in 13/15 children >20 kg (86.7%) versus 15/15 with lactulose (100.0%) (p<0.001). Parent education significantly influenced outcomes, with uneducated parents showing 5/8 paraffin oil efficacy (62.5%) versus 0/9 lactulose efficacy (0.0%) (p=0.021), while both treatments showed 100% efficacy in secondary and higher education groups. Socioeconomic stratification revealed poor families had 9/14 paraffin oil efficacy (64.3%) versus 0/13 lactulose efficacy (0.0%) (p<0.001), while middle and rich classes showed 100% efficacy for both treatments. Professional status analysis showed 100% efficacy for both treatments in employed and business owner categories, but jobless families demonstrated 12/17 paraffin oil efficacy (70.6%) versus 3/16 lactulose efficacy (18.8%) (p=0.003). Residential status revealed rural families had 11/16 paraffin oil efficacy (68.8%) versus 0/13 lactulose efficacy (0.0%) (p<0.001), while urban families showed 100% efficacy for both treatments. Duration analysis indicated that for constipation ≤6 months, both treatments achieved 100% efficacy (18/18 paraffin oil, 11/11 lactulose) (p=0.027), whereas for duration >6 months, paraffin oil showed 7/12 efficacy (58.3%) compared to 6/19 lactulose efficacy (31.6%) (p=0.189).

Table III

Association of Efficacy with Demographic Variables

Demographics variables		Groups	Efficacy Yes (n, %)	Efficacy No (n, %)	P-value
Age (years)	≤6	Paraffin Oil	13 (81.3%)	3 (18.8%)	<0.001*
		Lactulose	3 (18.8%)	13 (81.3%)	
	>6	Paraffin Oil	12 (85.7%)	2 (14.3%)	<0.001*
		Lactulose	14 (100.0%)	0 (0.0%)	
Gender	Male	Paraffin Oil	18 (78.3%)	5 (21.7%)	0.407
		Lactulose	15 (65.2%)	8 (34.8%)	
	Female	Paraffin Oil	7 (100.0%)	0 (0.0%)	0.007*
		Lactulose	2 (28.6%)	5 (71.4%)	
Weight (kg)	≤20	Paraffin Oil	12 (80.0%)	3 (20.0%)	<0.001*
		Lactulose	2 (13.3%)	13 (86.7%)	
	>20	Paraffin Oil	13 (86.7%)	2 (13.3%)	<0.001*
		Lactulose	15 (100.0%)	0 (0.0%)	
Parent Education	Uneducated	Paraffin Oil	5 (62.5%)	3 (37.5%)	0.021*
		Lactulose	0 (0.0%)	9 (100.0%)	
	Primary	Paraffin Oil	8 (80.0%)	2 (20.0%)	0.152*
		Lactulose	3 (42.9%)	4 (57.1%)	
	Secondary	Paraffin Oil	7 (100.0%)	0 (0.0%)	1.000*
		Lactulose	8 (100.0%)	0 (0.0%)	
	Higher	Paraffin Oil	5 (100.0%)	0 (0.0%)	1.000*
		Lactulose	6 (100.0%)	0 (0.0%)	
Socioeconomic Status	Poor	Paraffin Oil	9 (64.3%)	5 (35.7%)	<0.001*
		Lactulose	0 (0.0%)	13 (100.0%)	
	Middle	Paraffin Oil	10 (100.0%)	0 (0.0%)	1.000*
		Lactulose	9 (100.0%)	0 (0.0%)	
	Rich	Paraffin Oil	6 (100.0%)	0 (0.0%)	1.000*
		Lactulose	8 (100.0%)	0 (0.0%)	
Profession	Job	Paraffin Oil	6 (100.0%)	0 (0.0%)	1.000*
		Lactulose	9 (100.0%)	0 (0.0%)	
	Jobless	Paraffin Oil	12 (70.6%)	5 (29.4%)	0.003*
		Lactulose	3 (18.8%)	13 (81.3%)	
	Business	Paraffin Oil	7 (100.0%)	0 (0.0%)	1.000*
		Lactulose	5 (100.0%)	0 (0.0%)	
Residential Status	Rural	Paraffin Oil	11 (68.8%)	5 (31.3%)	<0.001*
		Lactulose	0 (0.0%)	13 (100.0%)	
	Urban	Paraffin Oil	14 (100.0%)	0 (0.0%)	<0.001*
		Lactulose	17 (100.0%)	0 (0.0%)	
Duration (months)	≤6	Paraffin Oil	18 (100.0%)	0 (0.0%)	0.027*
		Lactulose	11 (100.0%)	0 (0.0%)	

>6	Paraffin Oil	7 (58.3%)	5 (41.7%)	0.189*
	Lactulose	6 (31.6%)	13 (68.4%)	

***Fisher's Exact Test**

DISCUSSION

This study results demonstrate superior overall efficacy of paraffin oil (83.3%) compared to lactulose (56.7%, p=0.047), which can be attributed to their distinct mechanisms of action. Paraffin oil functions as a lubricant laxative that softens stool and facilitates easier passage through mechanical lubrication of the intestinal tract, while lactulose acts as an osmotic laxative that draws water into the bowel lumen, requiring adequate hydration and colonic bacterial fermentation for optimal effectiveness. The age-dependent efficacy patterns observed, particularly lactulose's superior performance in children >6 years (100% vs 85.7% for paraffin oil), likely reflects the maturation of colonic microbiota and improved compliance with fluid intake in older children, as lactulose's osmotic effect requires sufficient bacterial fermentation and adequate hydration. The striking gender difference favoring paraffin oil in females (100% vs 28.6% lactulose efficacy) may be explained by physiological differences in colonic transit time and hormonal influences on gastrointestinal motility, where the mechanical lubrication provided by paraffin oil proves more reliable than the osmotic mechanism that depends on variable individual factors.

Our study population showed similar baseline demographics between groups, with mean ages of 6.53±3.07 years for paraffin oil and 6.73±3.10 years for lactulose groups. This age range is consistent with previous studies, including Karami Hassan et al. [16] who studied children aged 1-15 years, and Torabi Zohreh et al. [17] who included children aged 2-12 years. The duration of constipation in our study (7.17±4.04 months for paraffin oil group and 10.80±6.54 months for lactulose group) indicates chronic functional constipation, aligning with the chronic nature addressed in all referenced studies.[16-24]

Our study demonstrated significantly superior efficacy for paraffin oil compared to lactulose, with 83.3% effectiveness versus 56.7% respectively (p=0.047). This finding directly supports Farahmand's earlier work[24] which compared liquid paraffin with lactulose in 247 children aged 2-12 years and concluded that "liquid paraffin resulted in a higher success rate with fewer side effects compared to lactulose" and should be "the first-choice laxative for childhood functional constipation."

However, our results contrast with studies comparing paraffin to polyethylene glycol (PEG), where findings were more mixed. Karami Hassan et al. [16] found PEG slightly more effective than paraffin, while Torabi Zohreh et al. [17] found no significant difference between PEG and paraffin overall, though paraffin showed better therapeutic effects in children under three years old. Abbaslou Parvin et al. [18] found no significant differences between PEG 3350 and liquid paraffin in treatment efficacy.

Our age-stratified analysis revealed interesting patterns that partially align with existing literature. We found paraffin oil particularly effective in children ≤6 years (81.3% vs 18.8% for lactulose, p<0.001), which supports Torabi Zohreh et al.'s finding [17] that "paraffin showed better therapeutic effects in children under three years old." However, Karami Hassan et al. [20] reported the best PEG response in children aged 12-23 months and over 60 months, suggesting age-related effectiveness may vary depending on the comparison medication.

Our study uniquely examined the impact of socioeconomic factors on treatment efficacy, revealing that paraffin oil was particularly effective in lower socioeconomic groups (poor families: 64.3% vs 0.0% for lactulose, p<0.001) and among parents with lower education levels. This demographic analysis is not extensively covered in the referenced literature, making our findings a novel contribution to understanding treatment effectiveness across different population segments.

Our gender analysis showed remarkable efficacy in females (100.0% for paraffin oil vs 28.6% for lactulose, p=0.007), while male efficacy was more modest (78.3% vs 65.2%, p=0.407). The referenced studies [16-24] do not provide detailed gender-specific efficacy comparisons, making this another unique contribution of our research.

Our analysis of treatment efficacy based on constipation duration showed that both treatments achieved 100% efficacy for shorter durations (≤6 months), while longer durations showed reduced effectiveness. This aligns with the general principle mentioned by Abbaslou Parvin et al. [18] that identified "positive family history of constipation as a poor prognostic factor," suggesting that chronic, long-standing constipation may be more challenging to treat regardless of the medication used.

While our study focused on oral administration, Farahmand et al. [23] specifically compared oral versus rectal paraffin oil administration, finding "no significant difference in treatment efficacy between the two methods, but higher family satisfaction and compliance with the oral route." This supports the practical utility of our oral paraffin oil approach.

Our findings support the recommendations from clinical practice guidelines. Rowan-Legg [19] emphasized the importance of "daily maintenance stool softeners" and noted that "PEG is safe, effective, and well-tolerated," while our study suggests paraffin oil may be equally or more effective, particularly in certain demographic groups. Prasanth K.S. [21] advocated for "osmotic laxatives" in maintenance therapy, and our results suggest paraffin oil could be considered as a first-line osmotic agent, especially given its superior performance compared to lactulose.

The consistency of our paraffin oil efficacy with Farahmand's work [24] likely reflects similar study methodologies and patient populations. The differences observed when comparing our results to PEG studies may be attributed to different mechanisms of action, with PEG being a purely osmotic laxative while paraffin oil provides both osmotic and lubricating effects. The superior performance of paraffin oil in lower socioeconomic groups in our study might be related to factors such as medication adherence, dietary patterns, or access to healthcare, which warrant further investigation.

This study has several limitations that should be acknowledged. Being a single-center study, the generalizability of our findings may be limited to similar healthcare settings and patient populations. The relatively small sample size of 30 patients per group may have limited statistical power to detect smaller effect sizes and could affect the precision of our estimates. The study duration and follow-up period may not have been sufficient to assess long-term efficacy and safety profiles of both treatments. Additionally, the lack of blinding in this study could have introduced potential bias in outcome assessment, and the demographic characteristics of our study population may not be representative of all pediatric populations with functional constipation.

CONCLUSION

Our study has concluded that paraffin oil demonstrates superior efficacy compared to lactulose in the treatment of functional constipation in children. The results indicate that paraffin oil is particularly effective across various demographic subgroups, showing remarkable benefits in younger children, females, and families from lower socioeconomic backgrounds. These findings align with previous literature supporting paraffin oil as an effective treatment option and suggest that demographic factors play a crucial role in treatment response. The study reinforces the potential of paraffin oil as a preferred first-line therapeutic option for pediatric functional constipation, especially in resource-limited settings where cost-effectiveness and accessibility are important considerations.

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REFERENCES

1. Rajindrajith, S., Devanarayana, N. M., & Benninga, M. A. (2022). Childhood constipation: Current status, challenges, and future perspectives. *World Journal of Clinical Pediatrics*, *11*(5), 385-404. https://doi.org/10.5409/wjcp.v11.i5.385
2. Tran, D. L., & Sintusek, P. (2023). Functional constipation in children: What physicians should know. *World Journal of Gastroenterology*, *29*(8), 1261-1288. https://doi.org/10.3748/wjg.v29.i8.1261
3. Koppen, I. J., & Benninga, M. A. (2022). Functional constipation and Dyssynergic defecation in children. *Frontiers in Pediatrics*, *10*. https://doi.org/10.3389/fped.2022.832877
4. Wallace, C., Sinopoulou, V., Gordon, M., Akobeng, A. K., Llanos-Chea, A., Hungria, G., Febo-Rodriguez, L., Fifi, A., Fernandez Valdes, L., Langshaw, A., & Saps, M. (2022). Probiotics for treatment of chronic constipation in children. *Cochrane Database of Systematic Reviews*, *2022*(3). https://doi.org/10.1002/14651858.cd014257.pub2
5. Lamanna, A., Dughetti, L. D., Jordan-Ely, J. A., Dobson, K. M., Dynan, M., Foo, A., Kooiman, L. M., Murakami, N., Fiuza, K., Foroughi, S., Leal, M., Vidmar, S., Catto-Smith, A. G., Hutson, J. M., & Southwell, B. R. (2018). Treatment of fecal impaction in children using combined polyethylene glycol and sodium picosulphate. *JGH Open*, *2*(4), 144-151. https://doi.org/10.1002/jgh3.12062
6. Claßen, M., Righini-Grunder, F., Schumann, S., Von Gontard, A., & De Laffolie, J. (2022). Constipation in children and adolescents. *Deutsches Ärzteblatt international*. https://doi.org/10.3238/arztebl.m2022.0309
7. Bassotti, G., Usai Satta, P., & Bellini, M. (2021). Chronic idiopathic constipation in adults: A review on current guidelines and emerging treatment options. *Clinical and Experimental Gastroenterology*, *14*, 413-428. https://doi.org/10.2147/ceg.s256364
8. Cho, Y. S., Lee, Y. J., Shin, J. E., Jung, H., Park, S., Kang, S. J., Song, K. H., Kim, J., Lim, H. C., Park, H. S., Kim, S., Cha, R. R., Bang, K. B., Bang, C. S., Yim, S. K., Ryoo, S., Kye, B. H., Ji, W. B., & Choi, M. (2023). 2022 Seoul consensus on clinical practice guidelines for functional constipation. *Journal of Neurogastroenterology and Motility*, *29*(3), 271-305. https://doi.org/10.5056/jnm23066
9. De Geus, A., Koppen, I. J., Flint, R. B., Benninga, M. A., & Tabbers, M. M. (2023). An update of pharmacological management in children with functional constipation. *Pediatric Drugs*, *25*(3), 343-358. https://doi.org/10.1007/s40272-023-00563-0
10. Harris, R. G., Neale, E. P., & Batterham, M. (2024). Efficacy of probiotics compared with pharmacological treatments for maintenance therapy for functional constipation in children: A systematic review and network meta-analysis. *Nutrition Reviews*, *83*(6), 1006-1034. https://doi.org/10.1093/nutrit/nuae119
11. Sharif, F., Crushell, E., O'Driscoll, K., & Bourke, B. (2001). Liquid paraffin: A reappraisal of its role in the treatment of constipation. *Archives of Disease in Childhood*, *85*(2), 121-124. https://doi.org/10.1136/adc.85.2.121
12. Chu, N., Ling, J., Jie, H., Leung, K., & Poon, E. (2022). The potential role of lactulose pharmacotherapy in the treatment and prevention of diabetes. *Frontiers in Endocrinology*, *13*. https://doi.org/10.3389/fendo.2022.956203
13. Zhang, Y., Li, A., Qiu, J., Wen, H., Zhang, H., & Sun, X. (2024). Probiotics for functional constipation in children: An overview of overlapping systematic reviews. *Frontiers in Cellular and Infection Microbiology*, *13*. https://doi.org/10.3389/fcimb.2023.1323521
14. Karakan, T., Tuohy, K. M., & Janssen-van Solingen, G. (2021). Low-dose Lactulose as a prebiotic for

improved gut health and enhanced mineral absorption. *Frontiers in Nutrition*, *8*. https://doi.org/10.3389/fnut.2021.672925
15. Farahmand, F. (2007). A randomised trial of liquid paraffin versus lactulose in the treatment of chronic functional constipation in children. Acta Med Iran, 45(3), 183-8.
16. Hassan, K., Hussein, K., Alireza, A., Mohammad, K., Ali, T., Parisan, N., & Hussein, S. (2008). Comparison the efficacy of polyethylene glycol and paraffin for the treatment of childhood functional constipation. *Medwell Res J Biol Sci, 3*(6), 665-8. https://www.cabidigitallibrary.org/doi/full/10.5555/20083097867
17. Torabi, Z., Amiraslani, S., Diaz, D., Ahmadiafshar, A., & Eftekhari, K. (2017). Comparison of Paraffin versus Polyethylene Glycol (PEG) in Children with Chronic Functional Constipation. *DOAJ (DOAJ: Directory of Open Access Journals)*, *5*(10), 5845–5852. https://doi.org/10.22038/ijp.2017.23726.2004
18. Parvin, A., Farzaneh, A., & Nasab Ali, H. (2012). A Comparative Trial: The Safety and Clinical Efficacy of PEG 3350 and Liquid Paraffin in Management of Chronic Functional Constipation in Children. *International Journal of Clinical Medicine*, *03*(05), 383–386. https://doi.org/10.4236/ijcm.2012.35072
19. Rowan-Legg, A. (2011). Managing functional constipation in children. *Paediatrics & Child Health*, *16*(10), 661-665. https://doi.org/10.1093/pch/16.10.661
20. Karami, H., Khademlou, M., & Niari, P. (2009). Polyethylene glycol versus paraffin for the treatment of childhood functional constipation. *Iran J Pediatr, 19*(3), 255-61.
21. Prasanth, K. (2022). Functional constipation in children. *Annals of Pediatric Gastroenterology & Hepatology*, *1*(1), 1-9. https://doi.org/10.5005/jp-journals-11009-0001
22. van der Spek N, (2019). *Children with functional constipation*. Health Service Executive.
23. Farahmand, F., Eftekhari, K., Modarresi, V., Najafi-Sani, M., Khodadad, A., & Motamed, F. (2010). Comparing oral route paraffin oil versus rectal route for disimpaction in children with chronic constipation; a randomized control trial. *Iranian Journal of Pediatrics*, *20*(3), 291.
24. Farahmand, F. (2007). A randomised trial of liquid paraffin versus lactulose in the treatment of chronic functional constipation in children. Acta Med Iran, 45(3), 183-8.