Journal for Quality in Women's Health
DOI : https://doi.org/10.30994/jqwh.v9i1.331 https://jqwh.org/
ISSN: 2615-6660 (print); 2615-6644 (online) Vol.9 No 1.March 2026.Page 12-22

EFFECT OF PURPLE SWEET POTATO FIBER INTAKE ON BOWEL HABIT IMPROVEMENT IN PRESCHOOL CHILDREN

Siswi Wulandari [1] *, Bram Mustiko Utomo* [2]
[1.2] Undergraduate Midwifery Study Program, Kadiri University, Kediri, Indonesia
Corresponding author: [1] siswiwulandari@unik-kediri.ac.id

ABSTRACT

Functional constipation and irregular bowel habits in preschool children are frequently linked to inadequate dietary fiber intake and remain challenging to address with family-friendly, practical approaches. This study proposes a locally available, child-acceptable solution using purple sweet potato as a dietary fiber source, offering a feasible alternative to commercial fiber supplements. The objective was to examine the effect of purple sweet potato fiber intake on bowel habit improvement in preschool children. A quasi-experimental one-group pretest–posttest design was conducted over 14 days among 36 preschool children. Primary outcomes included bowel movement frequency, stool consistency, and constipation symptom score. Results showed that bowel movement frequency increased from 4.0±1.6 to 5.6±1.7 times/week (Δ=+1.6; $p<0.001$), stool consistency improved from 2.5±0.5 to 3.1±0.6 (Δ=+0.6; $p<0.001$), and constipation symptom scores decreased from 3.2±1.1 to 1.9±1.2 (Δ=−1.3; $p<0.001$), with large effect sizes across all outcomes. In conclusion, a two-week purple sweet potato–based fiber intervention was associated with clinically meaningful improvements in bowel regularity, stool quality, and constipation-related symptoms in preschool children. The key advantage of this work lies in its community-feasible, locally sourced intervention supported by daily monitoring, strengthening the practical relevance for families and early childhood health programs.

Keywords: Childhood Constipation, Dietary Fiber, Purple Sweet Potato

1. INTRODUCTION

Functional constipation and irregular bowel habits are common gastrointestinal health problems in children, including preschoolers. This condition not only causes physical symptoms such as hard stools, pain during bowel movements, straining, and abdominal discomfort, but can also impact appetite, play and learning activities, children's emotions, and even the burden of caregiving at home. In the context of primary and community health services, constipation in children is a recurring complaint and requires prevention and treatment strategies that are safe, easy to implement, and acceptable to both children and families (Koppen et al., 2018). This issue is relevant because preschoolers are developing eating patterns and toileting habits, so appropriate interventions during this phase have the potential to produce more lasting behavioral changes.

By definition, functional constipation in children is generally diagnosed based on symptoms, not organic disorders, with reference to the Rome IV criteria. Common symptoms include low bowel movement frequency, hard stool consistency, pain during bowel movements, defecation retention, and/or the passage of large stools, while still considering the presence of warning signs to rule out organic causes (Zeevenhooven et al., 2017). In preschool children, assessing bowel movement patterns in the field is often hampered by parents not always recording bowel movement frequency, difficulty consistently describing stool shape, and not all complaints are clearly expressed by children. Therefore, a community-based research approach needs to use practical yet standardized measurements, for example through bowel movement diaries and stool consistency scales that are easily understood by parents (Huysentruyt et al., 2019).

The specific problem focused on in this study is low fiber intake and irregular bowel habits in preschool children, which can potentially lead to constipation. Dietary fiber plays a crucial role in digestive health by helping form stool mass, increasing water retention in the stool, and supporting bowel movements. In children, adequate fiber intake is also associated with fruit and vegetable consumption and a balanced diet. However, meeting fiber needs in preschool children is often challenging due to taste and texture preferences, a snacking culture, and limited menu variety at home. Nutritional guidelines emphasize the importance of consuming a diverse diet and adequate fiber appropriate for age, but implementation requires a realistic strategy tailored to the family context (Ministry of Health of the Republic of Indonesia, 2019). Therefore, interventions based on locally sourced foods that are easy to prepare, affordable, and preferred by children are a rational choice for increasing fiber intake while improving bowel habits.

The purple sweet potato (Ipomoea batatas) was chosen as the object of this study because it has the potential as a source of fiber and carbohydrate components that can support digestive health. Purple sweet potatoes are also easily available in Indonesia, can be processed into various forms of child-friendly menus/snacks, and are in accordance with the local food empowerment approach to support children's health at the community level. In addition to fiber, sweet potatoes, including purple sweet potatoes, are also known to contain resistant starch, which can act as a "functional fiber" because it is not digested in the small intestine and can be fermented in the colon, thus theoretically supporting better gut conditions (Wang et al., 2024). Another advantage of purple sweet potatoes is the flexibility of processing (pudding, sweet

potato balls, steamed cakes, or puree), which allows for standardization of intervention portions and monitoring of consumption compliance in the study.

Previous studies on fiber and constipation in children have shown that fiber-based interventions have the potential to improve constipation symptoms, but the scientific evidence remains variable due to differences in fiber type, dosage, duration, subject characteristics, and outcome measurement methods (de Mello et al., 2018). Furthermore, recent studies emphasize the importance of assessing outcomes more comprehensively and realistically in community settings, focusing not only on clinical diagnoses but also on measurable changes in bowel habits, such as bowel frequency, stool consistency, and accompanying complaints (Hojsak et al., 2022). In the context of local food, direct evidence on the use of purple sweet potato as a fiber source to improve bowel habits in preschool children is still limited, especially in Indonesia. Therefore, feasible applied research is needed in early childhood education centers (PAUD)/Posyandu (Integrated Service Posts) with standardized, easily accessible monitoring instruments for parents.

Based on this gap, this study offers a solution in the form of **a purple sweet potato menu/snack intervention as a source of fiber** provided in standardized portions and frequencies over a certain period, accompanied by monitoring of bowel habits using **a bowel diary** , **stool consistency scale** , and **constipation complaint questionnaire** . The contribution (novelty) of this study lies in: (1) the use of local ingredients (purple sweet potato) as a fiber-increasing strategy that is easy for families to adopt; (2) focusing on simple behavioral/clinical outcomes that are relevant in the community (bowel frequency, stool consistency, constipation complaints), not just theoretical claims; and (3) the preparation of an implementation package (intervention SOP and monitoring instruments) that can be replicated in PAUD/Posyandu settings. With an appropriate design, this study is expected to be a pioneering initial step for the development of local food-based interventions in improving the digestive health of preschool children.

This study addressed key confounding factors—such as fluid intake, physical activity, and toileting habits—through structured recording to ensure robust and unbiased interpretation of the results. The aim of this study was to analyze the effect of purple sweet potato fiber intake on improving bowel habits in preschool-aged children, as measured by changes in bowel frequency, stool consistency, and constipation.

2. METHODS

Study Design and Setting

This quantitative study used a one-group pretest–posttest quasi-experimental design . This design was chosen to evaluate changes in bowel habits before and after a purple sweet potato-based fiber intake intervention in a community setting. The study was conducted starting in January 2025 at partner PAUD/Posyandu (Early Childhood Education and Health Post) in Kediri City, Indonesia.

Participants and Population

The study population was 36 preschool-aged children (3–6 years) registered at PAUD/Posyandu partners and who met the participation criteria.

Inclusion criteria : (1) age 3–6 years; (2) parent/guardian signs informed consent after explanation; (3) parent/guardian is willing to record daily bowel habits during the study; (4) child does not experience acute diarrhea at baseline.

Exclusion criteria : (1) presence of warning

signs that indicate an organic cause (e.g., gastrointestinal bleeding, persistent vomiting, persistent high fever, persistent severe abdominal pain, significant weight loss, history of chronic gastrointestinal disease/disorder); (2) regular use of laxatives or drugs that affect intestinal motility during the study period; (3) allergy/intolerance to intervention components.

Recruitment

Recruitment was conducted by total sampling of children who met the criteria at the study site until the population size (n=36) was reached. Parents/guardians received an explanation of the study's purpose, procedures, benefits, and potential minimal risks before signing the informed consent.

Intervention

The intervention consisted of providing a menu/snack made from purple sweet potato (Ipomoea batatas) as a source of fiber in standardized portions for 14 consecutive days . The daily portion was set at approximately 50–80 g of cooked purple sweet potato/day (according to SOP), given once per day at a relatively consistent time. Parents/guardians received written guidance on how to serve, store, and record consumption. Intervention compliance was monitored through daily compliance sheets and periodic verification by enumerators.

Measurement and Instruments

Measurements were taken at two time points: baseline (pretest) and day 14 (posttest) , with daily recordings throughout the intervention.

Main outcomes :

1. Bowel movement frequency (times/week) was calculated from the bowel movement diary. For consistency of evaluation, bowel movement frequency was summarized as the total number of bowel movements in the 7 days before the intervention (baseline) and the 7 days leading up to the end of the intervention (posttest).
2. Stool consistency was assessed using a 1–5 scale (1=very hard, 2=hard, 3=normal, 4=soft, 5=liquid) completed by parents each time the child defecated. Values were summarized as the average score over the 7-day baseline and 7-day posttest summary periods.
3. Constipation complaints were measured using a symptom checklist (scored 0–6) that included: infrequent bowel movements, hard stools, straining, pain during bowel movements, bowel-holding behavior, and very large stools. Scores were assessed at baseline and posttest.

Exposure and compliance :

- Consumption compliance is calculated as the percentage of days the child consumed the specified portion: (number of days compliant/14) × 100%.

Covariates/confounding variables (noted) :

- Daily fluid intake (category), physical activity (summary), toileting/holding bowel habits, other fiber consumption and medication use during the intervention.

The instruments used included: informed consent, inclusion-exclusion and danger sign screening, baseline characteristics and covariate questionnaire, bowel diary, stool consistency scale, constipation complaint checklist (baseline and posttest), compliance sheet, and enumerator SOP checklist.

Data Collection and Quality Control Procedures

At baseline, enumerators trained parents/guardians on completing the bowel movement diary and using the stool consistency scale, including case examples to improve assessment consistency. Regular monitoring (visits, phone calls, or

WhatsApp) was conducted to ensure adherence to consumption and completeness of recordings. Data were checked for completeness and consistency. If adverse events (e.g., persistent diarrhea, severe abdominal pain, or alarm symptoms) occurred, the intervention was discontinued and the child was referred according to partner service procedures.

Statistical Analysis

The analysis was performed using statistical software (e.g. SPSS).

1. Descriptive statistics : continuous variables are presented as mean±SD or median (IQR), while categorical variables are presented as n(%).
2. Normality test : Shapiro–Wilk on the distribution of changes (post–pre) for each outcome.
3. Pretest–posttest difference test (in groups) :
   - If the data is normally distributed: *paired t-test* .
   - If not normal: Wilcoxon signed-rank test.
4. Additional analyses : The relationship between adherence and outcome changes was analyzed using correlation (Pearson/Spearman) or simple regression; key covariates (fluids, activity, toileting) were entered into linear/logistic regression according to outcome type to test for consistency of effect after controlling for confounding factors. Results were reported as mean/median difference in change, 95% confidence intervals , p-values, and effect sizes where relevant. The significance threshold was set at $p < 0.05$.

Ethical Considerations

Parents/guardians signed informed consent. Participants' identities were encrypted and kept confidential. Participation was voluntary and could be discontinued at any time without consequences to the services received.

Student Engagement and MBKM Recognition

Students are involved as part of the MBKM Research Project in structured roles: assisting with instrument recruitment and education (under supervision), compliance monitoring, record verification, data entry and cleaning, and support in the preparation of outputs (SOPs/interventions and manuscript drafts). MBKM recognition is demonstrated through logbooks, performance assessments, progress reports, and research presentations.

3. RESULTS

Participant Flow

A total of 36 preschool children met the inclusion criteria and participated in the study until completion. All participants completed the 14-day intervention and had complete pretest–posttest data for all primary outcomes (n=36). There were no serious adverse events that led to discontinuation of participation.

Basic Characteristics of Participants

Table 1. Baseline characteristics of preschool children and related factors (n=36)

Variables	Category/Statistics	n	%
Age (years)	Mean ± SD	4.4 ± 0.7	–
Gender	Man	14	38.9
	Woman	22	61.1
Toilet trained	Yes	30	83.3
	No	6	16.7
History of holding in bowel movements	Yes	12	33.3
	No	24	66.7
Fluid intake/day	<3 glasses	7	19.4
	3–5 glasses	22	61.1
	>5 glasses	7	19.4
Daily fruit/vegetable consumption	Yes	24	66.7
	No	12	33.3
Physical activity ≥60 minutes/day	Yes	20	55.6
	No	16	44.4

The mean age of the children was 4.4 ± 0.7 years . Participants were predominantly

female (61.1%) and most were toilet trained (83.3%) . A history of bowel-holding behavior was reported in 33.3% of the children. The majority of fluid intake was in the 3–5 glasses/day category (61.1%) , while 66.7% of the children consumed fruit/vegetables daily.

Compliance with Purple Sweet Potato Intervention Consumption

Table 2. Compliance with consumption of purple sweet potato menu/snacks for 14 days

Compliance indicators	Mark
Days of compliance (median [IQR])	12 [2] days
Compliance (%) (mean ± SD)	86.4 ± 9.1
Good compliance (≥80%)	27 (75.0%)
Moderate compliance (60–79%)	9 (25.0%)
Low compliance (<60%)	0 (0%)

Compliance with consumption during the intervention was considered good. Median adherence was 12 out of 14 days, with an average adherence of 86.4% , and 75.0% of participants achieved good adherence (≥80%).

Changes in Bowel Habits

The Shapiro–Wilk normality test on the difference (Δ=post–pre) showed an adequate distribution of changes for parametric analysis on the primary outcome (p>0.05), so pretest–posttest comparisons were performed using a paired t-test .

Table 3. Changes in pretest–posttest outcomes after 14 days of intervention (n=36)

Outcome	Pretest (mean ± SD)	Posttest (mean ± SD)	Δ (post–pre) mean	95% CI for Δ	Test	p-value	Effect size (Cohen's dz)
Frequency of bowel movements (times/week)	4.0 ± 1.6	5.6 ± 1.7	+1.6	1.2 to 2.0	Paired t-test	<0.001	1.50
Stool consistency score (1–5)	2.5 ± 0.5	3.1 ± 0.6	+0.6	0.4 to 0.8	Paired t-test	<0.001	1.20
Constipation complaint score (0–6)	3.2 ± 1.1	1.9 ± 1.2	−1.3	−1.6 to −1.0	Paired t-test	<0.001	1.40

The 14-day purple sweet potato intervention was associated with significant improvements in all indicators of bowel habits. Defecation frequency increased from 4.0 ± 1.6 to 5.6 ± 1.7 times/week (Δ= +1.6 ; 95% CI 1.2–2.0; p<0.001), indicating increased defecation regularity. Stool consistency improved toward a more normal category, indicated by an increase in the score from 2.5 ± 0.5 to 3.1 ± 0.6 (Δ= +0.6 ; 95% CI 0.4–0.8; p<0.001). Furthermore, constipation complaints decreased from 3.2 ± 1.1 to 1.9 ± 1.2 (Δ= −1.3 ; 95% CI −1.6 to −1.0; p<0.001). The effect sizes were in the large category (Cohen's dz >0.8) for all primary outcomes, indicating clinically meaningful changes in the short-term intervention period.

Additional (Exploratory) Analysis: Adherence and Outcome Changes

To evaluate whether adherence was related to the magnitude of outcome change, Spearman correlation analysis was performed between adherence (%) and outcome change (Δ).

Table 4. Correlation of compliance (%) with outcome changes (Δ)

Variables	Δ Frequency of Defecation	Δ Stool consistency	Δ Constipation score
Compliance (%)	r=0.22; p=0.198	r=0.19; p=0.269	r=−0.25; p=0.142

Adherence showed a consistent direction of association with improved outcomes, but did not reach statistical significance (p>0.05). This finding is exploratory and may be influenced by the relatively narrow variance

in adherence, as most participants were in the good adherence category.

Overall, increasing fiber intake through a 14-day purple sweet potato menu/snack intervention showed significant improvements in bowel regularity, stool consistency toward normal, and a reduction in constipation in preschool children. These results directly address the research problem formulation and objectives regarding the effect of purple sweet potato fiber intake on improving bowel habits.

4. DISCUSSION

This study evaluated the effect of purple sweet potato fiber intake on improving bowel habits in preschool-aged children using a one-group pretest–posttest design over 14 days. Overall, the findings showed significant improvements in all key outcomes. The frequency of defecation increased from 4.0 ± 1.6 to 5.6 ± 1.7 times/week (Δ= +1.6 ; 95% CI 1.2–2.0 ; p<0.001), stool consistency improved from 2.5 ± 0.5 to 3.1 ± 0.6 (Δ= +0.6 ; 95% CI 0.4–0.8 ; p<0.001), and the constipation complaint score decreased from 3.2 ± 1.1 to 1.9 ± 1.2 (Δ= −1.3 ; 95% CI −1.6 to −1.0 ; p<0.001). The effect sizes for all three outcomes were large (Cohen's dz 1.20–1.50), supporting that the changes were not only statistically significant but also clinically relevant in the short term. These findings indicate that the research questions were answered as intended, although caution is still needed in making causal inferences due to the lack of a control group (Koppen et al., 2018; Tabbers et al., 2014; Mulhem et al., 2022).

4.1. Conformity of findings with clinical purpose and significance

Benchmarks for research success were established from the outset based on (1) statistical significance of pre–post changes (p<0.05) and (2) a significant direction of change : increased bowel movement frequency, stool consistency moving toward "normal," and decreased constipation symptoms. An improvement in bowel movement frequency of +1.6 times/week over 14 days indicates better bowel movement regularity. An increase in stool consistency score of +0.6 indicates a shift from hard stools to more normal stools, while a decrease in constipation score of -1.3 indicates a reduction in the symptoms most experienced by the child/family (pain, straining, and holding in bowel movements). The combination of these three outcomes aligns with the functional constipation evaluation approach in children, which emphasizes defecation function and symptoms, rather than clinical diagnosis alone (Zeevenhooven et al., 2017; Benninga et al., 2016; Vriesman et al., 2020).

4.2. Similarities and differences with previous research (methods, data, results)

In general, the results of this study are consistent with the literature suggesting that increasing fiber can help improve childhood constipation, although evidence is often heterogeneous due to differences in fiber type, dose, duration, and outcome definition (de Mello et al., 2018). The main similarities between this study and previous studies are the use of a diet/fiber approach as a non-pharmacological strategy and the measurement of clinically relevant outcomes (frequency, stool consistency, symptoms). Important differences are that the fiber source used was a local food (purple sweet potato) , rather than commercial fiber or supplements, and the study was conducted in a community setting (ECD/Posyandu), thus providing applied evidence closer to everyday promotive-preventive practices (Hojsak et al., 2022; Mulhem et al., 2022).

In terms of methods, this study used a pretest–posttest design without a control , which is more feasible in community settings but less effective in establishing causality than a controlled trial. Therefore, the findings should be understood as changes occurring after the intervention, with possible contributions from other

factors such as toileting habits and increased parental attention to bowel habits during the recording period (Tabbers et al., 2014; de Geus et al., 2023). However, using daily records by parents with a stool consistency scale may improve the accuracy of observations compared to relying solely on memory (Huysentruyt et al., 2019).

From a biological standpoint, purple sweet potato contributes not only through fiber but also through components such as resistant starch, which can be fermented in the colon. Experimental evidence suggests that resistant starch from purple sweet potato can modulate gut microbiota homeostasis, which theoretically could support improved bowel function and defecation output (Wang et al., 2024). Therefore, the improvements in stool consistency and symptom reduction found in this study have plausible mechanistic support.

4.3. Were the objectives achieved and why (success factors)

The study objective—to assess whether purple sweet potato fiber intake is associated with improved bowel habits—was achieved because all primary outcomes changed as hypothesized and were significant. This success was likely supported by good adherence: a median of 12 [2] days of adherence with a mean of 86.4 ± 9.1% , and 75% of children were categorized as well-adherent (≥80%). High adherence increases the likelihood that fiber exposure actually increased during the intervention, making physiological changes in stool mass and softness more likely. Furthermore, daily monitoring (diaries) and regular communication may encourage parents to be more consistent in toileting routines and pay attention to fluids—components that are recommended in the non-pharmacological management of childhood constipation (Mulhem et al., 2022; Tabbers et al., 2014).

Additional analyses showed that the correlation between adherence and outcome change was not significant (e.g., r=0.19–0.25; p>0.05), which may be due to the narrow variability in adherence (mostly high adherence) resulting in low power to detect a dose–response relationship. This finding does not negate the effect of the intervention, but suggests that in small samples with relatively homogeneous adherence, correlational analyses are often less sensitive.

4.4. Benchmarks of success/failure and precautionary interpretation

The success of this study was assessed based on significant and consistent pre-post changes in the three outcomes. However, the uncontrolled design limits the ability to confirm that all changes are solely due to purple sweet potato. Changes could also be influenced by time, other dietary changes, or monitoring effects. Clinical guidelines emphasize that response to dietary interventions is often influenced by the behavioral package (diet, fluids, toileting) and individual characteristics (Tabbers et al., 2014; Vriesman et al., 2020). Therefore, the most appropriate claim from this study is that the purple sweet potato intervention is associated with improved bowel habits within 14 days in a community setting, and this requires verification with a more robust design.

4.5. Limitations

This study has several limitations. First, the one-group pretest–posttest design without a control limits causal inference and cannot completely eliminate confounding factors. Second, the 14-day intervention duration was insufficient to assess the sustainability of the effect. Third, outcome recording relied on parent self-report, potentially exposing the patient to information bias despite training. Literature suggests that stool assessment reliability can be improved with appropriate instruments, but remains dependent on filler consistency (Huysentruyt et al., 2019). Fourth, total fiber and fluid intake were not quantified in detail, so the contribution of "total fiber" outside the intervention could not be

precisely separated (Hojsak et al., 2022). Fifth, the sample size (n=36) limited subgroup analysis and the detection of dose-response relationships.

4.6. Implications and suggestions for further research

Practically, these results demonstrate the potential feasibility of a local food intervention (purple sweet potato) to promote healthy bowel habits in preschool children in the community. To strengthen the evidence and generalize, further research is recommended using a control group or cluster-based randomization, extending the duration (e.g., 4–8 weeks), and measuring total fiber and fluid intake in greater detail. Recent systematic reviews/meta-analyses also emphasize the need for rigorous studies to map the determinants of childhood constipation and more robustly evaluate dietary interventions (Djurijanto et al., 2024; Rajindrajith et al., 2024). Furthermore, exploring mechanisms (e.g., microbiota-related indicators/fiber fermentation) can be considered to strengthen the pathway of effect (Wang et al., 2024).

5. CONCLUSION

This study shows that a local food-based intervention involving the consumption of purple sweet potato snacks for 14 days in preschool children is associated with improvements in bowel habit indicators. Improvements were seen in increased defecation regularity, improved stool characteristics toward more normal levels, and reduced constipation-related symptoms. Quantitatively, pre-post changes showed an increase in bowel frequency and stool consistency scores, as well as a decrease in constipation complaint scores, with a consistent and meaningful pattern of change. The large effect size on the primary outcome indicates that the changes are not merely small fluctuations but are potentially clinically relevant in the context of short-term interventions.

However, causal interpretations should be approached with caution. The main limitations of this study are its one-group pretest–posttest design without a control group, the relatively short intervention duration (14 days), and the reliance on parental records for measurement. This suggests that other factors (e.g., changes in fluid intake, toileting habits, or monitoring effects) may still influence the outcome. Furthermore, total daily fiber intake outside the intervention was not measured in detail, so the contribution of fiber from other foods cannot be precisely separated.

Based on these limitations, further research is recommended using comparative designs (e.g., control groups or cluster-based randomization), extending the intervention duration to assess the sustainability of effects, and conducting more detailed dietary measurements (total fiber and fluid intake) and monitoring toileting behavior. Additional mechanistic studies (e.g., indicators of fiber fermentation or proxies for microbiota health) may also be considered to strengthen the explanation of the effect pathway.

The implication of this study is that purple sweet potato as a source of fiber that is easily accessible and acceptable to children has the potential to be a promotive strategy in the community (PAUD/Posyandu) to support healthy bowel habits in preschool children, especially as part of nutrition education and habituation of digestive health behaviors at the family level.

6. ACKNOWLEDGMENTS

The author would like to express his gratitude to **the LP3M of Kadiri University** for their support in facilitating the implementation of research activities and the preparation of this scientific article. He also thanks **the Faculty of Health Sciences of Kadiri University** and **the Midwifery Study Program of Kadiri University** for their academic and administrative support

throughout the research process. He appreciates the cooperation **of the PAUD/Posyandu partners** (teachers, cadres, and administrators) who have assisted in the implementation of activities in the field. He also expresses his deepest gratitude to **the parents/guardians and children participating in the research** for their participation, willingness to complete daily records, and commitment throughout the intervention . Finally, he would like to thank **the students involved** as enumerators/field assistants for their contributions in data collection and management under the researcher's supervision.

7. REFERENCE

Benninga, M.A., Faure, C., Hyman, P.E., St. James Roberts, I., Schechter, N.L., & Nurko, S. (2016). Childhood functional gastrointestinal disorders: Neonate/toddler. *Gastroenterology, 150* (6), 1443–1455.e2. https://doi.org/10.1053/j.gastro.2016.02.016

de Geus, A., Koppen, I. J. N., Flint, R. B., & Tabbers, M. M. (2023). An update of pharmacological management in children with functional constipation. *Pediatric Drugs, 25* , 343–358. https://doi.org/10.1007/s40272-023-00563-0

de Mello, P. P., Ewald, D. A., & Morais, M. B. (2018). Use of fibers in childhood constipation treatment: Systematic review with meta-analysis. *Jornal de Pediatria (Rio J), 94* (5), 460–470. https://doi.org/10.1016/j.jped.2017.10.014

Djurijanto, F., Lin, S.-H., Vo, N.-P., Le, NQK, Nguyen-Hoang, A., Shen, S.-C., et al. (2024). Prevalence and determinants of constipation in children in Asia: A systematic review and meta-analysis. *EClinicalMedicine, 71* , 102578. https://doi.org/10.1016/j.eclinm.2024.102578

Hojsak, I., Benninga, M.A., Hauser, B., et al. (2022). Benefits of dietary fiber for children in health and disease. *Archives of Disease in Childhood* . https://doi.org/10.1136/archdischild-2021-323571

Huysentruyt, K., Koppen, IJN, Benninga, M.A., et al. (2019). The Brussels Infant and Toddler Stool Scale: A study on interobserver reliability. *Journal of Pediatric Gastroenterology and Nutrition, 68* (2), 207–213. https://doi.org/10.1097/MPG.0000000000002153

Ministry of Health of the Republic of Indonesia. (2019). *Balanced nutrition guidelines* . Ministry of Health of the Republic of Indonesia.

Koppen, IJN, Vriesman, M.H., Saps, M., Rajindrajith, S., Shi, X., van Etten-Jamaludin, F.S., Di Lorenzo, C., & Benninga, M.A. (2018). Prevalence of functional defecation disorders in children: A systematic review and meta-analysis. *The Journal of Pediatrics, 198* , 121–130.e6. https://doi.org/10.1016/j.jpeds.2018.02.029

Mulhem, E., Khondoker, F., & Kandiah, S. (2022). Constipation in children and adolescents: Evaluation and treatment. *American Family Physician, 105* (5), 469–478.

Rajindrajith, S., Gordon, M., Dovey, T.M., Benninga, M.A., et al. (2024). Dietary interventions for the management of chronic constipation in children (Protocol). *Cochrane Database of Systematic Reviews, 2024* (2), CD014865. https://doi.org/10.1002/14651858.CD014865

Tabbers, M.M., DiLorenzo, C., Berger, M.Y., Faure, C., Langendam, M.W., Nurko, S., Staiano, A., Vandenplas, Y., & Benninga, M.A. (2014). Evaluation and treatment of functional constipation in infants and children: Evidence-based

recommendations from ESPGHAN and NASPGHAN. *Journal of Pediatric Gastroenterology and Nutrition, 58* (2), 258–274. https://doi.org/10.1097/MPG.0000000000000266

Vriesman, M.H., Koppen, I.J.N., Camilleri, M., Di Lorenzo, C., & Benninga, M.A. (2020). Management of functional constipation in children and adults. *Nature Reviews Gastroenterology & Hepatology, 17* (1), 21–39. https://doi.org/10.1038/s41575-019-0222-y

Wang, Z., Gao, M., Kan, J., Cheng, Q., Chen, X., Tang, C., Chen, D., Zong, S., & Jin, C. (2024). Resistant starch from purple sweet potatoes alleviates dextran sulfate sodium-induced colitis through modulating the homeostasis of the gut microbiota. *Foods, 13* (7), 1028. https://doi.org/10.3390/foods13071028

Zeevenhooven, J., Koppen, I. J. N., & Benninga, M. A. (2017). The new Rome IV criteria for functional gastrointestinal disorders in infants and toddlers. *Pediatric Gastroenterology, Hepatology & Nutrition, 20* (1), 1–13. https://doi.org/10.5223/pghn.2017.20.1.1