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Original Article

The outcome of functional constipation in Saudi children

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ABSTRACT

Background. Understanding the outcome of functional constipation (FC) for both patients and physicians is essential, yet it has been infrequently reported worldwide. The objective of this report was to update the outcomes of FC in Saudi children.

Methods. Clinical data including age, sex, response to management, duration of follow up, and type of management were collected from the notes of each clinic visits and phone call follow-ups.

Results. The study included 268 children followed up for a 7 year duration. The median age of onset was 4 (0.1 to 13) years, and 123/268 (46%) were male. There was an increasing recovery rate with increasing duration of follow up with an overall recovery rate of 79%. There was no significant association between recovery and age at onset (p=0.0860) or duration of constipation (P=0.124). Management by pediatric gastroenterologists did not increase rate of recovery (81% vs. 77%, p=0.432) or being cured (47% vs. 36%, p=0.108) significantly. According to the parents of children who recovered, diet in association with polyethylene glycol (PEG) and toilet training were most helpful. Poor diet and nonadherence to medications were the most common causes of lack of recovery.

Conclusions. The higher rates of recovery in this Middle Eastern childhood population than other populations are possibly related to cultural characteristics. The parents' views support the importance of diet associated with other modalities as important parts of management. Further research is needed to identify correctable causes of nonadherence to treatment to improve recovery.

Key words: chronic constipation, prognosis, Saudi children.

Functional gastrointestinal disorders are common in infants and children worldwide. The Rome IV criteria for functional constipation (FC) issued by the Rome Foundation are currently used in clinical practice to identify children with chronic or recurrent constipation not caused by organic conditions.[1,2] In a recent review, Fedele et al.[3] reported higher prevalence rates of FC in Western compared with Asian populations, including an 18.2% prevalence in a recent review in 2023.[4] In another review, the prevalence of FC in North and South America, China, Sri Lanka and India, including infants and adolescents, ranged from 0.5 to 29.6%.[5] Similarly, recent studies from the Kingdom of Saudi Arabia (KSA) reported prevalence between 9.1% and 34.5% in infants and toddlers, respectively.[6-8]

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Despite this high prevalence and well-known clinical features worldwide[9-11], data on the outcome are relatively scarce. In a systematic review based on Western populations published in 2010, the overall 6- to 12-month follow up recovery rate was 60.6%.[12] However, the authors indicated that the studies were heterogeneous, using different definitions, populations, outcome measures, and follow-up periods, resulting in large variations in recovery rates. In addition, although children with FC account for about 3% of general pediatric (GP) clinic visits and 25% of the pediatric gastroenterology (PGI) clinics[9], data on the effect of type of clinical care on recovery rate are limited. In non-Western populations, data on the outcome of FC are even more scarce. Therefore, the objective of this study was to determine the outcome of FC in Saudi children, a Middle- Eastern pediatric population, including the factors associated with recovery.

Materials and Methods

The study was performed at King Khaled University Hospital, King Saud University in Riyadh, KSA. This hospital provides primary, secondary and tertiary medical care. The inclusion criteria were: 1) Children 13 years of age or younger, diagnosed with FC based on the Rome IV criteria during the study period from 2014 to 2023. 2) Documented follow-up clinical visit notes. 3) Response to follow-up phone calls for children who did not attend the clinic for more than one year. The study design consisted of a review of medical records and follow-up via phone calls. The information collected included the sex, age of onset, duration of constipation, management modality, duration of follow up, and whether the patient was managed by GPs or PGIs. Follow-up data at each clinic visit included the interval between visits and the outcome, including response to management. Further long-term follow-up data for children with no clinic visit for more than one year were obtained via phone calls.

The outcome, assessed either at the clinic or by phone follow-up, was classified into two categories: 1) Recovery if the child had a normal bowel habit (≥ 3 soft bowel motions per week) for at least three months. This category was divided in two groups: The improved group, if the children still needed medication; and the cured group, if the children were completely off medications. 2) No recovery if the child still had constipation despite conventional treatment for more than 3 months. Other information obtained from the parents during follow up phone calls included the most helpful treatment for those who recovered and the cause of no recovery from the parent's point of view.

Statistical analysis

Data were analyzed using SPSS (Statistical Package for Social Sciences) version 26.0 software (IBM, Inc., Armonk, NY, USA).[13] Descriptive statistics (median, range, frequency, and percentage) were used to describe the quantitative and categorical variables. Bivariate analysis with Pearson's chi-square test was used to observe associations between categorical study variables and clinical response to treatment. Nonparametric statistical tests (Mann–Whitney U test and Kruskal–Wallis test) were used to compare the means of the skewed quantitative variables in relation to follow-up outcomes (cured, improved, recovered and nonrecovered). A P value ≤ 0.05 was used to indicate statistical significance.

Ethical approval: This study was approved by the College of Medicine Institutional Review Board, King Saud University (No. 21/01096/IRB).

Results

Two hundred sixty- eight children with FC met the inclusion criteria with a duration of follow up from 0.5 to 7 years. The median and the range of age of onset of FC were 4 (0.1 to 13) years, and 123/268 (46%) patients were male. Management started with parental education (37%), including information on the chronic nature of the condition, slow response to treatment, the need for continuous medication adherence and

follow up. The dietary advice included fluids, vegetable and fruit intake. Parental education was delivered by pediatric residents or pediatric gastroenterology fellows. Treatment included disimpaction at presentation (32.3%), by sodium phosphate enema (18%) or polyethylene glycol (PEG) (8%), maintenance with PEG (60%) or lactulose (33%), and other medications including bisacodyl, sodium picosulfate – magnesium citrate, probiotics and glycerin suppositories in 7%. The outcome by duration of follow up is shown in Table I, indicating variation of rates of recovery and cure, with the duration of follow up with an overall recovery and cure rates of 79% and 41%, respectively. Table II shows the factors associated with recovery, indicating no significant association with either demographic or clinical features (P>0.05). Table III depicts a comparison of the recovery rate in children managed by GPs and PGIs, indicating a tendency of higher recovery rate. According to the parents of children who recovered, the most helpful modalities included diet, PEG, lactulose, and toilet training in 38%, 33%, 27%, and 13%, respectively. Finally, the most common causes of lack of recovery reported by the parents were poor diet and nonadherence to medication in 29/35 (83%). Other causes included unavailability of medication and unsuitable toilet facilities.

Discussion

Information on the outcome of FC in children is essential for accurate education in patients and physician. In this study, the data collected from the medical records of clinic visits were supplemented with prospective follow-up data obtained via phone calls of families of children who missed the clinic appointments for one or more years. This approach increased the duration of follow-up and allowed longer term estimation of recovery rates.

Table I. Outcome of functional constipation by duration of follow up.

Duration of follow up (years)	Number of children	Recovery, n (%)		No recovery, n (%)
		Improved	Cured	
0.5 – 1	21	13 (81)	3 (19)	5 (23.8)
1 – 2	76	32 (55)	26 (45)	18 (24)
2 – 3	59	28 (58)	20 (42)	11 (19)
3 – 4	45	22 (61)	14 (39)	9 (20)
4-5	37	20 (61)	13 (39)	4 (11)
5-7	30	11 (52)	10 (48)	9 (30)
Overall	268	126 (59)	86 (41)	56 (21)

The differences in rates of recovery in relation to duration of follow-up was not statistically significant (P=0.779).

Table II. Factors associated with favorable outcomes in children with functional constipation (N=268).

Variables	Recovery(n=211)	No Recovery(n=57)	P value
Age at onset, yr, mean± SD	5.08 (3.5)	4.62 (3.2)	0.393
Sex, n (%)			0.518
Males (n=123)	99 (80%)	24 (20%)	
Females (n=145)	112 (77%)	33 (23%)	
Duration of constipation, mo, mean±SD	11.69 (16.73)	10.74 (15.9)	0.717
Duration of follow up, mo, mean± SD	35.32 (18.0)	34.67 (19.4)	0.811
Treating physician, n (%)			0.429
General pediatrician (n=157)	121 (77%)	36 (23%)	
Pediatric gastroenterologist (n=111)	90 (81%)	21 (19%)	

SD: standard deviation.

Table III. Outcome of functional constipation by type of care.

Variables	General pediatric clinics (n=157)	Pediatric gastroenterology clinic (n=111)	P value
Male sex, n (%)	66 (42.0%)	57 (51.4%)	0.132
Age at onset, yr, median (range)	4 (0.1-13)	4 (0.1-13)	0.779
Duration of constipation, mo, median (range)	3 (0.1-84)	8 (0.1-120)	0.015
Maintenance medication, n (%)			0.099
Lactulose	55 (65.5%)	29 (34.5%)	
Polyethylene glycol	94 (54.7%)	78 (45.3%)	
Duration of follow up, yr, median (range)	2.5 (0.5- 7)	2.9 (0.5-7)	0.096
Recovery, n (%)	121 (77%)	90 (81%)	0.432
Cure among those with recovery, n/N (%)	44/121 (36%)	42/90 (47%)	0.108

The outcome of FC by duration of follow up

Comparison of our results with the Western literature is challenging because of the heterogenous nature of most reports. The finding of 75% recovery rate (improvement and cure) after 0.5 to 1 year follow up in this study is higher than the mean of 60.6% recovery regardless of the need of laxative.[14-16] After a follow up from 1 to 2 years, the 76% recovery rate in this report is higher than the reported range between 48% - 69.3% regardless of laxative use.[17,18] In addition, the 70% recovery rate in children followed 5 to 7 years is higher than the reported 56.3% regardless of laxative use.[17,19,20] Finally, the 79% overall recovery rate during the follow up from 0.5 to 7 years duration is clearly higher than previous reports. The reasons for the higher recovery rate in this study compared to most reports are not clear. Possible explanations include population differences in cultural, dietary and bowel habits (such as diets richer in fiber and non-Western types of toilets), but more recent data and extended follow up of the patients are more likely. Data from non-Western populations are scarce. In a study from Thailand, after one year of follow-up, the 78% recovery rate is comparable to the 75% in this study.[21] However, in a study from Brazil, after a mean follow up period of 2.8 years, the 50.6% recovery rate is lower.[22] It is possible that their patients who were referred from primary to tertiary care may be more difficult to treat, whereas our patients are treated in a primary, secondary, and tertiary care settings.

Factors associated with recovery

Our finding of no significant association between age at onset or duration of constipation and recovery is consistent with previous reviews reporting no significant impact of these factors on outcome.[10] Although not statistically significant, the trend of increasing recovery with the duration of follow up is consistent with a study from Brazil.[22]

The effect of the type of clinical care on the recovery rate

The finding of higher recovery rate (including rate of being cured) in children managed by PGI's than those managed by GP's is consistent with the conclusions of previous reports.[17,22] It is possible that the lack of statistical significance is related to the significantly different durations of constipation in children managed by PGIs, suggesting more severe disease (P=0.015). Accordingly, our data support the general practice that children with FC may be primarily managed by GPs and prompt referral to PGIs be reserved for cases not responding to conventional management.

Parental viewpoints on treatment modalities

Parental viewpoints on the most helpful management for recovery and causes of nonresponse are important for physicians when designing management programs. To our knowledge, this issue has rarely been reported worldwide. The parents' beliefs that

diet, associated with other modalities, was most helpful is consistent with most literature, supporting the need to include dietary advice in the management program of children with FC.[9] Finally, the finding by parents that nonadherence to medication and poor diet were the most common causes of non-recovery highlights the need for further studies to identify the causes of nonadherence to improve recovery.

Study limitations

The most important limitation is the retrospective design which includes potential recall bias of some information such as onset of constipation and incomplete documentation in the medical notes. Another limitation is the hospital-based setting with the potential of missing milder cases that did not require attending hospitals.

Conclusion

The higher rate of recovery in this Middle Eastern childhood population than other populations is possibly related to cultural characteristics. The parents' views support the importance of diet associated with other modalities as important parts of management. Further research is needed to identify correctable causes of nonadherence to treatment to improve recovery.

Ethical approval

This study was approved by the College of Medicine Institutional Review Board, King Saud University. (date: 23.01.2024. number: 24/1008/IRB).

Author contribution

The authors confirm contribution to the paper as follows: Study conception and design: MEM, data collection: H A, MK, NA, RA, NAH, NAZ, AAS and AA, draft manuscript preparation: MEM, SA. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

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