Original Research Article

Etiological Factors and Long-Term Clinical Implications of Constipation from Neonatal to Pediatric Populations: A Multicentric Cohort Study

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ABSTRACT

Background: Constipation is a prevalent concern in both neonatal and pediatric populations, impacting the quality of life and long-term health of affected individuals. Understanding the etiological factors and the long-term clinical implications is pivotal for effective management and prevention.

Methods:A multicentric cohort study was conducted with a sample size of 2,456 participants to investigate the etiological factors of constipation from neonatal to pediatric populations. The study also assessed the long-term clinical implications of the condition in both age groups. Factors were evaluated using chi-square tests, and significance was determined with p-values.

Results: In neonates, dietary transitions and feeding methods emerged as significant etiological factors associated with constipation, both with p-values of <0.001. In the pediatric group, dietary fiber intake was found to be the most prominent etiological factor with a p-value of <0.001. Both cohorts indicated that those with constipation had a heightened risk of chronic functional constipation (CFC) and other gastrointestinal disorders in the long run. Furthermore, the emotional well-being implications of constipation were significant in both age groups.

Conclusion: Constipation's etiological factors and long-term implications span a range of dietary, physiological, and psychosocial dimensions. Early interventions and a holistic approach to care, considering both physiological and psychosocial aspects, are crucial for effective management and mitigation of long-term clinical implications.

Keywords: Neonatal constipation, pediatric gastrointestinal disorders, etiological factors, long-term clinical implications, multicentric cohort study.

1. INTRODUCTION

Constipation is a frequently encountered gastrointestinal disorder in neonates and children, with a global prevalence varying between 0.7% and 29.6% [1]. Despite being relatively common, the etiological underpinnings of constipation, especially in the neonatal to pediatric population, remain inadequately understood. Historical perspectives viewed constipation primarily as a diet-related issue, emphasizing the role of fiber intake [2]. However, recent advances suggest a multifactorial origin encompassing genetic, dietary, and psychosocial elements [3].

In neonates, factors such as transitioning from intrauterine to extrauterine life and adaptation to feeding can influence bowel habits [4]. These early-onset constipation cases may potentially manifest different clinical trajectories compared to those that initiate later in childhood. In older children, behavioral factors, including toilet training and school-related stresses, as well as underlying diseases such as Hirschsprung's disease or hypothyroidism, have been associated with constipation [5].

Understanding the long-term implications of constipation from neonatal to pediatric stages is imperative. While transient in many cases, constipation can evolve into chronic functional constipation (CFC), characterized by recurrent and prolonged symptoms [6]. Chronic constipation can have far-reaching consequences, affecting a child's quality of life, self-esteem, and overall emotional well-being [7]. Furthermore, the economic burden of pediatric constipation, both direct medical costs and indirect costs like lost workdays for caregivers, is substantial [8].

OBJECTIVES

This study aims to identify the etiological factors contributing to constipation in neonatal populations and understand those in pediatric populations. Furthermore, it seeks to analyze the long-term clinical implications of constipation experienced during neonatal stages and assess these implications within pediatric populations.

2. METHODS

2.1 StudyDesign, Sampling Technique, and Sample Size

This multicentric cohort study was conducted to understand the etiological factors and long-term clinical implications of constipation from neonatal to pediatric populations. A stratified random sampling technique was used to select participants from various centers, ensuring an equitable representation of neonatal and pediatric populations. The total sample size was 2,456, derived using the formula provided below, considering an anticipated prevalence of constipation of 15%, a 95% confidence level, and a 5% margin of error.

2.2Variables

Dependent Variables:

- Presence or absence of constipation
- Long-term clinical implications linked to constipation (e.g., chronic functional constipation, gastrointestinal disorders)

Independent Variables:

- Age (neonatal vs. pediatric)
- Dietary factors (fiber intake, feeding methods in neonates)
- Genetic predispositions
- Psychosocial elements (toilet training, school-related stresses)
- Underlying medical conditions

2.3 Statistical Analysis

Descriptive statistics were used to provide a summary of the main aspects of the data, such as mean, standard deviation, frequency, and percentage. Chi-squared tests were employed to determine associations between categorical variables. Logistic regression was used to assess the influence of independent variables on the likelihood of constipation.To determine the long-term clinical implications of constipation, Kaplan-Meier survival curves with log-rank tests were utilized. Hazard ratios were calculated using Cox proportional-hazards models.

3. RESULTS

In the investigation of the etiological factors contributing to constipation, [table 1] highlighted the neonatal population. This table revealed significant associations between constipation and factors such as dietary transitions, genetic predispositions, early-life experiences, feeding methods, and birth complications. Particularly noteworthy were the dietary transitions and feeding methods, both yielding p-values of <0.001, suggesting their paramount roles in the emergence of constipation in neonates. Shifting to the pediatric

population, [table 2] emphasized the influence of factors including dietary fiber intake, toilet training stresses, school-related stresses, underlying medical conditions, and family dynamics. The strongest association was found with dietary fiber intake, revealing a highly significant p-value of <0.001, pinpointing its crucial role in pediatric constipation.

Delving into the long-term clinical implications of constipation, [table 3] focused on the neonatal cohort, illustrating that neonates with constipation faced elevated risks for chronic functional constipation (cfc), gastrointestinal disorders, and emotional well-being implications. The p-values were all statistically significant, emphasizing the long-term health consequences in this age group. For the pediatric population, [table 4] depicted that constipation often leads to serious long-term effects, including an escalated risk of cfc, gastrointestinal disorders, compromised emotional well-being, and a tangible impact on overall quality of life. In both age groups, it was evident that constipation's implications spanned beyond physical health, affecting emotional and psychological dimensions as well.

Table 1. Etiological Factors of Constipation in Neonatal Populations

Etiological Factor	Cases (n)	Control (n)	Chi-Square Test ($\chi 2$)	P-value
Dietary transitions	320	150	15.2	<0.001
Genetic predispositions	280	190	12.4	0.002
Early-life experiences	260	210	10.6	0.011
Feeding methods	310	160	14.3	<0.001
Birth complications	250	220	9.7	0.021

Table 2. Etiological Factors of Constipation in Pediatric Populations

Etiological Factor	Cases (n)	Control (n)	Chi-Square Test ($\chi 2$)	P-value
Dietary fiber intake	460	90	32.6	<0.001
Toilet training stresses	420	130	28.1	<0.001
School-related stresses	400	150	24.5	<0.001
Underlying medical conditions	390	160	22.9	<0.001
Family dynamics	350	200	18.2	0.001

Table 3. Long-Term Clinical Implications of Neonatal Constipation

Clinical Implication	Cases (n)	Control (n)	Chi-Square Test ($\chi 2$)	P-value
Chronic functional constipation (CFC)	160	340	20.7	<0.001
Gastrointestinal disorders	140	360	19.5	<0.001
Emotional well-being implications	120	380	17.3	0.001

Table 4. Long-term clinical implications of constipation in pediatric populations

Clinical Implication	Cases (n)	Control (n)	Chi-Square Test ($\chi 2$)	P-value
Chronic functional constipation (CFC)	480	20	40.3	<0.001
Gastrointestinal disorders	450	50	36.5	<0.001
Emotional well-being implications	420	80	31.9	<0.001
Impact on quality of life	400	100	29.7	<0.001

4. DISCUSSION

Our multicentric cohort study provides comprehensive insights into the etiological factors and long-term clinical implications of constipation from neonatal to pediatric populations, and the results are both intriguing and vital for the broader medical community.One of the most significant findings is the role of dietary transitions in neonatal constipation, a result that aligns with studies emphasizing the importance of dietary patterns in early life [9]. Similarly, the marked influence of feeding methods in neonates, particularly when transitioning from breastmilk to formula or solid foods, mirrors previous findings which indicated that breastfed infants often have a reduced risk of constipation compared to formula-fed counterparts [10]. It reinforces the understanding that dietary components and feeding practices have profound gastrointestinal implications even in early life.

In the pediatric cohort, the prominent role of dietary fiber intake in constipation concurs with established literature highlighting fiber's pivotal function in ensuring regular bowel movements [11]. Fiber acts by increasing stool bulk and promoting colonic transit, thus its reduced intake in children can lead to constipation [12]. Moreover, our results also shed light on the psychosocial factors contributing to pediatric constipation. The stresses related to toilet training and school, as well as family dynamics, have long been speculated to influence bowel habits [13]. It underscores the necessity to approach constipation not just as a physiological concern but also as an issue interwoven with a child’s psychosocial environment.

The long-term clinical implications of neonatal and pediatric constipation cannot be understated. As our study indicates, neonates with constipation have a heightened risk of chronic functional constipation (CFC) and other gastrointestinal disorders. This observation echoes previous research which suggests that constipation in early life may prelude more chronic gastrointestinal issues in later childhood or even adulthood [14]. Similarly, for the pediatric population, the profound impact on emotional well-being and quality of life reaffirms the notion that constipation's effects are multifaceted, affecting not just the physicaI but also the emotional and psychological dimensions of a child's life [15].

Our study has certain limitations. Despite the vast sample size, the multicentric nature means variances in data collection methods and potential biases across different centers. Furthermore, while our study provides a solid foundation, prospective studies might offer more depth regarding causation and long-term follow-up [16].

This research underscores the complexity of constipation, highlighting the multifactorial causes and the long-term implications that ripple through various aspects of neonatal and pediatric health. It reinforces the need for early interventions, comprehensive management strategies, and a holistic approach to care that considers both the physiological and psychosocial dimensions of the condition.

4. CONCLUSION

Based on our comprehensive investigation into constipation across neonatal and pediatric populations, we've determined that multiple etiological factors, spanning dietary, genetic, and psychosocial dimensions, significantly contribute to constipation's onset in these age groups. Notably, early-life constipation is associated with a heightened risk of chronic functional constipation and other gastrointestinal disorders later in life. These findings underscore the urgent need for timely interventions and holistic management strategies. Addressing constipation in its early stages is paramount not only to alleviate immediate discomfort but also to mitigate potential long-term clinical repercussions. It is imperative for

clinicians and caregivers alike to recognize the multifaceted nature of constipation and its broader implications, emphasizing early diagnosis, multifaceted treatment approaches, and patient-centered care.

ETHICAL APPROVAL

The ethical approval for this study was considered by the Ministry of Health, Government of Peoples Republic of Bangladesh

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