Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 6, 5179-5186
2024
Publisher: Learning Gate
DOI: 10.55214/25768484.v8i6.3141

Lifestyle changes in school children at risk of increasing functional constipation during COVID-19 pandemic

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Abstract: Lifestyle is a habit that occurs continuously in a person's life. Lifestyle in children includes eating, sleeping, and exercise/movement patterns. Functional constipation is a defecation disorder characterized by infrequent bowel movements, hard and painful stools. Constipation is related to lifestyle. Prevalence in school children 0.7-29.6%. Covid-19 pandemic era has brought unprecedented changes to daily life and impact on children functional constipation which may be caused by a low physical activity, dietary changes and sleep disturbance. Prior research that constipation during Covid-19 documented a 1.3 to 2.1-fold rise in. We aimed to review that the lifestyle patterns related to functional constipation in school children during the Covid-19 pandemic.

Keywords: *COVID-19 pandemic, Functional constipation, Lifestyle, School children.*

1. Introduction

A child's lifestyle is formed through habituation. The existence of technological advances can lead to sedentary behavior in school children, especially in the Covid-19 pandemic.[1] Since March 2020, the COVID-19 pandemic has brought unprecedented changes to daily life. Many countries implemented physical distancing and national lockdowns to control the spread of COVID-19 during the first two years of the outbreak.[2] The World Health Organization (WHO) declared COVID-19 a global pandemic, prompting widespread adaptations such as online schooling, restrictions on outdoor activities, and quarantine measures.[3] Multiple studies have documented a decline in physical activity, increased screen time, and shifts in dietary habits due to lockdowns and school closures. These changes have contributed to more sedentary behaviors and increased consumption of unhealthy foods, which are both known risk factors for constipation. A study in Italy found that children aged 6-18 years reduced their physical activity significantly, which correlated with an increase in screen time and calorie-dense snacks. [4,5]

Constipation is a prevalent and often challenging issue that affects many children, with significant implications for their quality of life and healthcare costs.[6] It is characterized by infrequent and painful defecation, fecal incontinence, and abdominal pain, affecting children's well-being and imposing stress on families. This condition is frequently encountered across all levels of healthcare, from primary to tertiary care settings.[7,8] The prevalence of constipation in childhood varies widely, with estimates ranging from 5% to 30%.[9] The underlying causes of constipation are painful defecation, fever, dehydration, dietary habits, psychological issues, toilet training, medications, and family history.[10] Notably, an unbalanced diet leading to overweight, poor toilet hygiene, and emotional stress are significant risk factors for constipation in elementary school children.[6,11]

Emerging studies from various regions, including Europe, have highlighted how the pandemic has exacerbated these risk factors. The shift to online schooling, and limited outdoor activities have significantly reduced children's physical activity levels. Additionally, the stress and uncertainty brought about by the pandemic have contributed to sleep disorders and changes in dietary habits. [12,13] The

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disruption of regular school routines might have reduced opportunities for children to maintain regular bowel habits, potentially worsening symptoms of constipation. [14]

Understanding the lifestyle changes and their impact on childhood constipation during the COVID-19 pandemic is crucial for developing effective strategies to mitigate these issues. By examining these patterns, we can identify key areas for intervention and support to enhance the quality of life for these children and their families during these challenging times. This review aims to explore the lifestyle patterns in school children which cause functional constipation during the pandemic.

2. Lifestyle of School Children During Pandemic

The Covid-19 pandemic has forced significant changes in daily routines in school children, including diet, physical activity and sleep patterns, all of which can affect digestive health.[2] Prior research involving children aged 3 to 5 years from 14 countries found that during the pandemic, there was an increase in sedentary lifestyle and a decrease in sleep time. In addition, children spend long periods of screen time and have less healthy diets, with higher consumption of high-fat and low-fiber foods.[15]

The World Health Organization (WHO) declared online schooling, restrictions on outdoor activities, and quarantine measures.[3] Online schooling and limited outdoor activities for children lead to increased screen time and a sedentary lifestyle. Excessive screen time can cause children to skip regular meal schedules, affecting digestive health. Sitting for long periods while watching TV or playing games can reduce the body's natural movement and put additional pressure on the abdomen, inhibiting regular bowel movements.[15] Globally, the pandemic has exacerbated the physical inactivity crisis in children, with research showing that less than half of children worldwide achieve recommended levels of physical activity.[16]

Sudden changes such as social restrictions, adaptation to online learning, lack of direct interaction with peers, and limited outdoor activities cause many children to experience emotional distress.[17] Screen time for school and entertainment has increased dramatically, which, without supervision, can impact sleep quality and mental health.[18] Children sensitive to change tend to feel anxious more quickly when their routines are disrupted. In addition, they may absorb anxiety from their parents or surroundings, especially when there are concerns related to health, economy or safety during the pandemic. Overall, stress in children during the pandemic is an additional factor that can worsen digestive disorders, such as constipation, as stress often affects the digestive system.[19]

3. Functional Constipation in School Children

Constipation is the presence of hard stools, painful bowel movements, and difficult stools to pass.[20] The definition of functional constipation is difficult or infrequent bowel movements from average frequency, painful defecation, the passage of hard stools, and the sensation of incomplete evacuation of stool. It is often not caused by any underlying systemic cause or anatomical defect. It is usually multifactorial, including environmental conditions, stress, diet, coping skills, and social support. Withholding behavior leads to stool retention which causes the colon to absorb more water, and makes the stool hard. The majority of children with constipation have functional constipation, as much as 95%, where there is no evidence of an organic cause.[6] Only a small proportion of children with constipation have an underlying organic cause.[3,6] Previous studies suggest that the average functional constipation in school children was 0.7% to 29.6%.[21]

A history of painful bowel movements, or social reasons most often causes functional constipation in school children. As a result, a child will hold in a bowel movement, causing more excellent water absorption through the rectal mucosa and hardening the stool, making it increasingly difficult to pass the stool.[22] This leads to a vicious cycle of retention, where the rectum becomes increasingly distended, resulting in fecal incontinence, loss of rectal sensation and eventually loss of the usual urge to defecate (Figure 1).[23]

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 6: 5179-5186, 2024
DOI: 10.55214/25768484.v8i6.3141

Figure 1.
The vicious cycle of constipation.

Rome IV criteria, where patients who had at least two symptoms out of 6 items on the requirements were considered constipated. These criteria include straining during defecation, hard stool, sensation of incomplete evacuation, sensation of anorectal obstruction, need for manual maneuvers to assist defecation, and defecation less than 3 times per week.[24] Stool consistency can be seen with the Bristol Scale can be helpful for patients to assess and describe aspects of the child's stool, facilitating recognition of the severity of constipation (Figure 2).[25]

Edelweiss Applied Science and Technology
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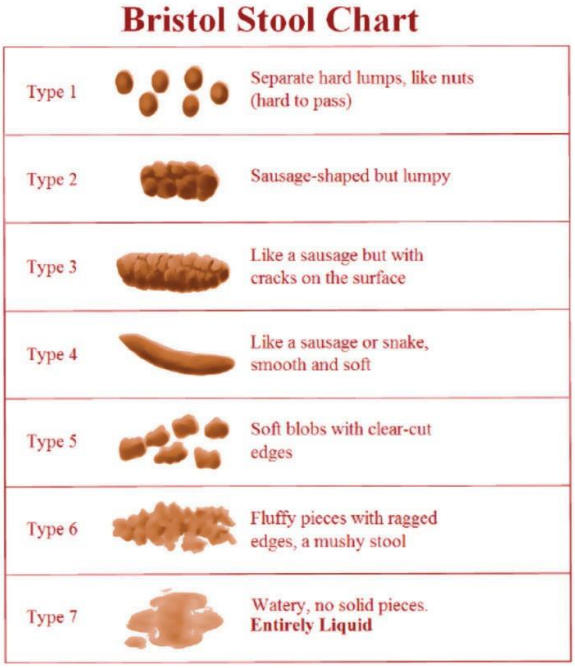

Figure 2.
Bristol stool chart.

Some risk factors for constipation in children are a history of painful bowel movements, chronic constipation during infancy, prematurity, decreased muscle tone, gender (especially in early infancy and at preschool age), cow's milk intolerance, inadequate nutrition (fiber poor diet, rich in fat and sugar, sugary drinks), low level of physical activity, sleep disorder, family history of functional constipation, sexual abuse, a psycho-emotional background which can generally be attributed to stress, desire for control, fears and phobias around changes in routine (examples include: toilet training, starting/changing nursery, family changes, etc), and children may also ignore the urge to defecate because their attention is focused on other more exciting activities such as playing gadgets, watching television.[22,26]

Constipation in school children can significantly impact their quality of life, both physically and psychologically. Some ways constipation affects the quality of life in children: 1. Physical Discomfort and Pain. Constipation often causes discomfort and pain during bowel movements, which can be quite intense for some children. This pain can interfere with daily activities and reduce pleasure in activities they would typically enjoy. 2. Psychological Issues. Children with chronic constipation may experience stress, anxiety and embarrassment related to their condition. They may fear bowel movements due to the associated pain, which can lead to delayed bowel movements and worsen the condition. 3. Impact on Social Life. Constipation can make children feel uncomfortable to participate in social or extracurricular activities, especially if they require easy access to the toilet. This can limit their social interactions and affect the formation of friendships. 4. Effect on Education. Pain and discomfort from constipation can distract from learning, affect concentration, and reduce class participation. Children may also be absent from school frequently due to their symptoms. 5. Sleep Patterns. Constipation and the associated discomfort can disrupt a child's sleep patterns, causing difficulty falling asleep or waking up at night. Lack of quality sleep can affect their mood, behavior, and learning ability. 6. **Effect on Food Intake**. Children with constipation often experience changes in appetite, which can affect their nutrient intake and potentially affect growth.[15]

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ISSN: 2576-8484
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4. Effect of Lifestyle Changes on Functional Constipation in School Children

The COVID-19 pandemic fundamentally altered children's lifestyles, reducing physical activity, increasing screen time, and disturbing sleep patterns, all of which correlated with a rise in constipation cases. These lifestyle changes, driven by lockdowns and social excessive screen use and its associated blue light exposure disrupt sleep, further affecting bowel function. The uncertainty and altered schedules during the pandemic likely contributed to irregular bowel routines, exacerbating constipation.[15] Prior research that constipation during Covid-19 documented a 1.3 to 2.1-fold rise in.[27]

Lifestyle patterns related to constipation in school children during the Covid-19 pandemic include various factors, both in Indonesia and in other countries. The pandemic has significant changes in daily routines, including diet, physical activity and use of leisure time, all of which can affect digestive health. Some factors that may contribute to constipation in school children during the pandemic: 1. **Lack of Physical Activity**. With social distancing and schools shifting to online learning, children spend more time indoors. Lack of physical activity can slow the digestive process and lead to constipation. 2. **Dietary Changes**. The pandemic may have changed children's diet, as they consume foods that lack fiber, such as processed foods and snacks. Low fiber intake is a significant cause of constipation. 3. **Stress and Anxiety**. The Covid-19 pandemic could have increased stress and anxiety levels in children, potentially affecting digestive function and causing constipation. 4. **Excessive Screen Use**. Online learning and recreational activities primarily done in front of a screen can reduce the time usually spent on physical activity, and exposure to blue light from screens can also disrupt children's sleep patterns, affecting digestive health. 5. **Changes in Daily Routine.** Uncertainty and changes in daily schedules during the pandemic can affect a child's bowel movement routine, which can cause or worsen constipation.[15]

Studies conducted in various countries show decreased physical activity and changes in diet patterns during the pandemic. Research involving children aged 3 to 5 years from 14 countries found that during the pandemic, there was an increase in sitting time and a decrease in sleeping time. This suggests significant changes in movement behavior that may affect digestive health.[15]

During the Covid-19 pandemic, there was an increase in screen time of more than 3 hours in 68.8% of students. Outdoor physical activity was also reported to decrease, along with increased anxiety levels in children.[28] A cohort study in Italy found that the average use of mobile phones increased during the pandemic. More than half of the subjects had more than 4 hours of screen time daily (an increase from 16.3% to 66.3%). Using a device from waking up is also shorter at 5 minutes. More than half of the children experienced increase screen time during the night.[29]

An Italian study on 4,314 children and adolescents showed a delay in bedtime in all age groups. Subjects took longer to initiate sleep during lockdown. Sleeping time was reduced in children and adolescents. Younger children also had more frequent nightmares.[30] The incidence of sleep disturbance was higher during lockdown than without lockdown.[31] During the pandemic, there have been changes in the nutritional intake of children. Research in South American countries shows increased consumption of processed foods such as sweets, chocolate, soft drinks, and other processed foods such as hamburgers, sausages and instant noodles. This increase in consumption of certain foods is associated with social isolation.[32]

5. Management of Functional Constipation in Children

Addressing constipation in school children and ensuring effective management is crucial to improving their quality of life. This involves a comprehensive approach that may include dietary changes, increased fluid intake, strengthening toileting routines, and sometimes medication use. Support from parents, caregivers, and health professionals is also critical to help the child overcome this problem successfully.[15] Lifestyle changes are essential in preventing and addressing constipation in children. Some recommendations include increasing fiber intake. Fiber helps facilitate bowel movements. Fiber-rich foods like fruits, vegetables, and whole grains can increase stool volume and make passing easier.[33] Regulating sleep patterns. Adequate sleep affects many bodily functions, including digestion. Studies show that insufficient sleep can be associated with a higher risk of constipation.[34] Reducing screen time

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ISSN: 2576-8484
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and increasing physical activity. Physical activity has been shown to improve intestinal motility. Reducing screen time and encouraging physical activities can help prevent constipation in children.[35]

When lifestyle changes are not sufficiently effective, medical intervention may be needed. Recommendations from healthcare providers include the use of mild laxatives appropriate for children, physical therapy and biofeedback exercises, which have proven effective in some cases of chronic constipation, especially in improving bowel control, regular consultations and health monitoring with healthcare professionals help monitor the child's condition, especially during and after the pandemic, allowing treatment to be adjusted based on the child's progress.[6,36,37]

Several kinds of mild laxatives used for functional constipation therapy: **Polyethylene Glycol (PEG)** is an osmotic laxative that increases the amount of water in the stool, making it softer and easier to pass. PEG is widely used in children as it is relatively safe and has few side effects. It is commonly prescribed as a first-line treatment for chronic constipation in children. **Lactulose** is an osmotic laxative that is fermented by gut bacteria into organic acids, which draw water into the large intestine. Lactulose is often recommended for children because of its mild side effects, although it may cause gas or bloating. It is usually used for children who require long-term treatment for constipation. **Mineral oil** works as a stool softener by coating the walls of the intestines and the stool, making it easier to pass. Mineral oil is typically used in the short term because of the side effects associated with long-term use. It is primarily given to children who have difficulty taking other osmotic laxatives. **Milk of Magnesia (Magnesium Hydroxide)** is an osmotic laxative that helps draw water into the intestines. This medication is commonly used in children as it works quickly and can help with mild to moderate constipation. It is generally used for children who need short-term treatment. **Bisacodyl** is a stimulant laxative that stimulates muscle movements in the large intestine. It is usually used when osmotic laxatives are not effective enough, but it is not recommended for long-term use in children due to potential side effects. It is primarily prescribed for constipation that is difficult to resolve with milder laxatives.[36,37]

Parents play a crucial role in supporting a healthy lifestyle for their children, especially enjoyably introducing healthy foods. Parents can help children stay active at home, encouraging play and light exercise to support bowel movements.[38] Parents should watch for changes in their child's bowel habits and seek medical help if constipation persists.[39]

6. Conclusion

Functional constipation in school children is a common issue with multifactorial causes, including environmental factors, diet, and psychological stress. During the Covid-19 pandemic, the increased prevalence of sedentary behaviors, poor dietary choices, and stress-related factors, all of which have contributed to a rise in child's functional constipation. Addressing functional constipation in school children requires a multifaceted approach, including lifestyle modifications such as increasing physical activity, enhancing fiber intake, regulating sleep patterns, and reducing screen time. In cases where lifestyle changes are insufficient, medical interventions like mild laxatives and physical therapy may be necessary. Moreover, parents play a critical role in managing their child's condition by promoting healthy habits and seeking medical advice when needed. Regular consultations with healthcare providers are crucial for monitoring the child's progress and adjusting treatment plans accordingly. Adopting these lifestyle modifications is essential to mitigate the risk of constipation

Acknowledgements:
We gratefully acknowledge the support and motivation of our Head of Department, Muhammad Faizi, MD, PhD, and the Child Health Department staff, which enabled us to complete this study.

Abbreviations:

Covid-19	: *Coronavirus Disease 2019*
ENS	: *Enteric Nervous System*
FGIDS	: *Functional Gastrointestinal Disorder*

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