REVIEW ARTICLE

An overview of pediatric chronic fatigue syndrome- a scoping review

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ABSTRACT

A clinical disorder known as chronic fatigue syndrome (CFS) is characterized by severe fatigue causing physical and psychosocial limitations. CFS has an unclear etiology and prognosis. This study examines the empirical literature comparing the prevalence, risk factors, impact on everyday life, and management associated with pediatric CFS. Investigators searched Scopus and PubMed databases utilizing the key terms Pediatric CFS, CFS/ME, Prevalence, Incidence, Epidemiology, Risk Factors, Genetic predispositions, Psychosocial factors, Impact, Quality of life, Impairment, Management, Intervention, and Treatment. A preliminary literature search found 1,860 articles. The inclusion criteria were articles published in English from 1994 onwards, focusing on pediatric chronic fatigue syndrome. After screening based on inclusion criteria, objectives, and language, 24 articles were selected for review. The analysis showed significant regional and global differences in the prevalence of pediatric CFS. Genetic characteristics, premorbid childhood difficulties, history of infectious disease, maternal prenatal conditions, and socio-economic status have been identified as risk factors for CFS. Children experience disruption and losses in physical, social, and psychological aspects of life because of CFS. There is currently no approved treatment for CFS in the pediatric population, even though some community-based and psychosocial intervention shows improvements in symptoms. The study underscores the need for standardized diagnostic criteria. It emphasizes the multifactorial nature of CFS onset, urging further research to elucidate causal pathways. Additionally, it stresses the significant impact of CFS on children's lives calling for comprehensive treatment strategies.

Keywords:
CFS, prevalence, risk factors, impact, management.

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INTRODUCTION

Chronic Fatigue Syndrome is a complex, weakening, and disabling disorder with a wide range of symptoms, sleep problems, pain, and impairments in cognitive abilities.[1] The National Institute for Health and Clinical Excellence in the United Kingdom (NICE) produced a clinical guideline on CFS in 2021. It stated that the illness can cause severe, long-lasting impairment and significantly affects the lives of patients and caregivers.[2] The underlying pathophysiology of CFS remains poorly understood, therefore diagnostic criteria are employed to identify CFS.[4] Patients often experience symptoms such as fatigue, unrefreshing sleep, and cognitive and physical impairments for more than 50% of the time, persisting for at least six months.[5] The symptoms of CFS in children and adults differ slightly.[6] Children can have trouble describing their symptoms exactly as they are. While adults are more likely to report pain, sore lymph nodes, and palpitations, children used to complain of headaches and fatigue.[7] Adults had been sick for a longer period and were more disabled and exhausted. Younger children were likelier to have a sore throat and less likely to exhibit cognitive signs. Compared to adults, adolescents were less likely to have pain, dizziness, palpitations, painful lymph nodes, and overall malaise, and more likely to experience headaches. Compared to adults, adolescents were less likely to experience anxiety and more likely to experience comorbid depression.[6]

In the pediatric population, fatigue that is often undefined and unrecognized is highly prevalent and can vary in severity. Pediatric CFS, a complex, multisystemic, and weakening condition, is marked by extreme and medically unexplained fatigue. This is often accompanied by symptoms such as headaches, insomnia, cognitive difficulties, post-exertional malaise (PEM), orthostatic intolerance, and other signs of autonomic dysfunction.[8] Moreover, pediatric CFS usually develops gradually, but a sudden onset is also occasionally possible.[9,10] Clinicians occasionally employ different criteria for diagnosing CFS in children than in adults. The Canadian Clinical Case Definition, the Royal College of Paediatrics and Child Health's proposed pediatric criteria, and the case definition developed by International Association for Chronic Fatigue Syndrome/Myalgic Encephalomyelitis's are all widely employed for the diagnosis of CFS in the pediatric population. To meet the diagnostic criteria, a child must demonstrate chronic fatigue that is unexplained, persistent, or relapsing, not related to ongoing exertion, and not significantly relieved by rest.[11] Studies state that a broad range of factors are involved in pediatric CFS.[5,12] The varying criteria for diagnosing pediatric ME/CFS significantly impact prevalence estimates. Since there is no definitive diagnostic test, the diagnosis is clinical, based on symptoms, and exclusion of other fatiguing conditions. Different studies may use slightly varied definitions or thresholds for symptoms, leading to fluctuations in estimates.[12] Research on pediatric CFS is limited, and the absence of standardized treatment protocols indicates a significant gap in the existing literature.[2,13,14] The NICE guideline published in 2021 reported the need for multidisciplinary care for people with CFS while acknowledging that symptoms can be managed.[2]

A deeper understanding of the multiple factors involved in pediatric CFS is essential for developing effective treatment strategies. A scoping review can map the current research landscape, identifying gaps and areas for future investigation. This review will provide a comprehensive overview of the prevalence, risk factors, impact, and management of CFS. The review typically covers the

pediatric population, which includes children and adolescents between the ages of 5 and 18 years. This range aligns with standard definitions of pediatric age groups in medical research and allows for a detailed exploration of CFS from early childhood through adolescence, capturing the unique developmental challenges and health needs of these age groups. Research on pediatric CFS is especially important because it can negatively impact a child's physical health, psychological well-being, and educational progress, potentially leading to long-term consequences.[15] The review will guide how resources are used and help to focus on areas where more research is needed. It can also help create targeted prevention plans, support programs, and interventions.

METHODS

Following the PRISMA extension for scoping review guidelines, the authors collected articles from electronic databases. The review followed the widely used Arksey and O'Malley framework, which is designed to map the current state of knowledge on a given topic.[16] The suggested five stages of scoping review used in this study are outlined as

Stage 1. Identifying the research question.

The purpose of this scoping review is to examine the empirical literature comparing the prevalence, risk factors, impact on everyday life, and management associated with CFS in the pediatric population.

Stage 2. Identifying relevant studies.

A comprehensive search strategy was conducted in Scopus and PubMed databases, and a reference list of relevant articles was also considered an option. The key terms used are Pediatric CFS, CFS/ME, Prevalence, Incidence, Epidemiology, Risk Factors, Genetic predispositions, Psychosocial factors, Impact, Quality of life, Impairment, Management, intervention, and Treatment. The Boolean operators used to identify articles are Pediatric CFS AND Prevalence, Pediatric CFS AND Risk Factors, CFS AND Impact, CFS AND Management, CFS AND Intervention, Pediatric CFS AND Treatment, Pediatric CFS OR Myalgic Encephalomyelitis, Pediatric CFS Risk Factors OR Psycho-Social Factors, Pediatric CFS Impact" OR "Quality of Life" OR "Functional Impairment, Pediatric CFS Treatment OR Management.

Stage 3. Study selection.

Initially, duplicate articles and non-English publications were excluded. Titles were screened for eligibility based on the inclusion criteria, which required studies to focus on pediatric Chronic Fatigue Syndrome, be published in English, and dated from 1994 onward, as the first clinical guidelines were introduced in that year. During the screening process, certain articles were excluded for specific reasons. Some were deemed irrelevant because they did not focus on the pediatric population or CFS. Others were excluded due to methodological issues, such as failing to use validated diagnostic criteria for CFS. Additionally, studies published in languages not included in the review or those that were not primary research, like editorials or opinion pieces, were also excluded. The quality of the selected articles was appraised using the Joanna Briggs Institute (JBI) Critical Appraisal Tools and the National Institutes of Health (NIH) Quality Assessment Tools. These tools evaluated various aspects, including the clarity of research questions, the appropriateness of study design, and the rigor of the analysis. A detailed quality assessment for each article is provided in the Tables 1-5[17,18].

Stage 4. Data charting.

To extract and analyse the selected studies, a table was created. After reviewing the chosen articles, the authors added relevant information to the table,

including the author and publication year, participant details, research methods, treatment plans, and key findings.

Stage 5. Collating, Summarizing, and reporting the result.

After identifying and categorizing the data, tables, and figures were used to present the scope and characteristics of the articles. This approach enabled the authors to highlight significant research gaps and offer recommendations for future studies and treatment strategies.

RESULTS

A preliminary check of the literature search resulted in 1,860 articles. After removing duplicates and entries from distinct populations, 420 articles remained. Following the elimination of items irrelevant to the objectives, 70 articles were left, of which 24 were chosen for examination.

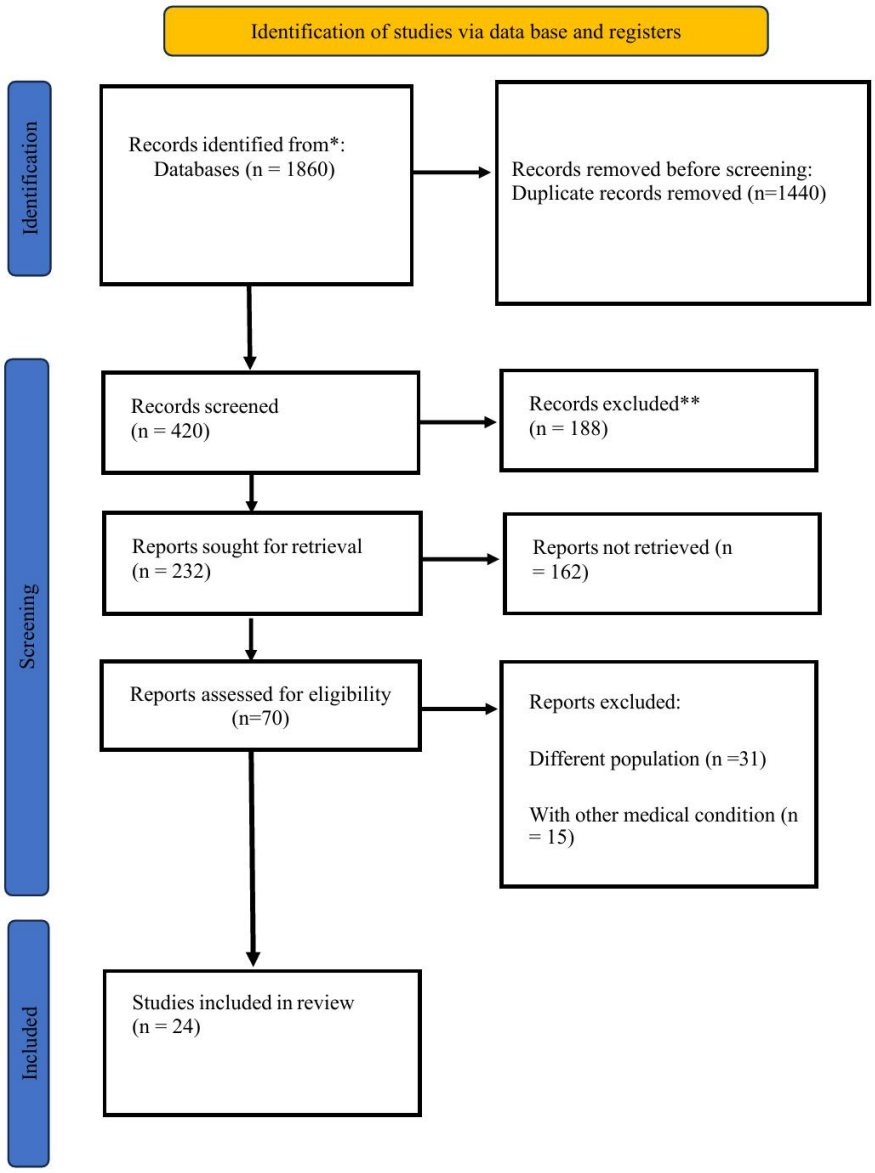

Figure 1. PRISMA Flow chart

Table 1. Quality appraisal of cohort studies using JBI checklist

JBI critical appraisal checklist for cohort studies	Studies							
	Crawley et al.	**Collin et al.**	**R.M. Viner et al.**	**Farmer et al.**	**Josev et al.**	**Sankey et al.**	**Haines et al.**	**Knight et al.**
1.Were the two groups similar and recruited from the same population?	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
2.Were the exposures measured similarly to assign people to both exposed and unexposed groups?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3. Was the exposure measured in a valid and reliable way?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4.Were confounding factors identified?	Yes	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes
5. Were strategies to deal with confounding factors stated?	Yes	Uncle ar	Yes	Yes	Unclear	Yes	Unclear	Yes
6. Were the outcomes measured in a valid and reliable way?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7. Was the follow up time reported and sufficient to be long enough for outcomes to occur?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8. Was follow up complete, and if not, were the reasons for loss to follow up described and explored?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9. Were strategies to address incomplete follow up utilized?	Yes	Yes	Yes	Unclear	Yes	Yes	Unclear	Yes

Table 2. Quality appraisal for randomised control trials using JBI checklist

JBI critical appraisal tool for RCT	Studies			
	Al-Haggar et al	**Gordon A et al**	**Nijhof et al**	**R. Viner et al**
True randomization followed.	Yes	Yes	Yes	Yes
Concealed allocation to treatment group done.	Yes	Yes	Yes	Yes
Treatment groups similar at the baseline.	Yes	Yes	Yes	Yes
Participants were blind to the assignment of treatment group.	Yes	Yes	Yes	Yes
Those who were delivering treatment were blind to assignment of treatment group.	Yes	Yes	Yes	Yes
The outcome assessors were blind to the assignment of treatment group.	Yes	Yes	Yes	Yes
Treatment groups were treated identically other than the desired intervention.	Yes	Yes	Yes	Yes
Follow-up complete and if not, were differences between groups in terms of their follow-up adequately described and analysed?	Yes	Yes	Yes	Yes
Participants analysed in the groups to which they were randomized.	Yes	Yes	Yes	Yes
Outcome measures done in the same way for treatment groups.	Yes	Yes	Yes	Yes
Outcomes are measured in a reliable way.	Yes	Yes	Yes	Yes
Statistical methods used were appropriate.	Yes	Yes	Yes	Yes
Appropriate trial design was used.	Yes	Yes	Yes	Yes

Table 3. Quality appraisal for cross-sectional studies using JBI check list

JBI critical appraisal for cross sectional studies	Studies					
	Crawley& Stern	**Jason et al**	**Nijhof et al**	**Haines et al**	**Bakken et al**	**Van de Putte et al.**
Were the criteria for inclusion in the sample clearly defined?	Yes	Yes	Yes	Yes	Yes	Yes
Were the study subjects and the setting described in detail?	Yes	Yes	Yes	Yes	Yes	Yes
Was the exposure measured in a valid and reliable way?	Yes	Yes	Yes	Yes	Yes	Yes
Were objective, standard criteria used for measurement of the condition?	Yes	Yes	Yes	Yes	Yes	Yes
Were confounding factors identified?	Unclear	Yes	Yes	Unclear	Unclear	Unclear
Were strategies to deal with confounding factors stated?	Unclear	Yes	Yes	Unclear	Unclear	Unclear
Were the outcomes measured in a valid and reliable way?	Yes	Yes	Yes	Yes	Yes	Yes
Was appropriate statistical analysis used?	Yes	Yes	Yes	Yes	Yes	Yes

Table 4. Quality appraisal for pre-test post-test interventional studies using NIH checklist

Checklist for pre-test post-test interventional studies	**Studies**		
	Lim& Lubitz	**Gordon & Lubitz**	**Lloyd et al**
Was the study question or objective clearly stated?	Yes	Yes	Yes
Were eligibility/selection criteria for the study population pre-specified and clearly described?	Yes	Yes	Yes
Were the participants in the study representative of those who would be eligible for the test/service/intervention in the general or clinical population of interest?	Yes	Yes	Yes
Were all eligible participants who met the pre-specified entry criteria enrolled?	Yes	Yes	Yes
Was the sample size sufficiently large to provide confidence in the findings?	No	No	Yes
Was the test/service/intervention clearly described and delivered consistently across the study population?	Yes	Yes	Yes
Were the outcome measures pre-specified, clearly defined, valid, reliable, and assessed consistently across all study participants?	Yes	Yes	Yes
Were the people assessing the outcomes blinded to the participants' exposures/interventions?	Yes	Yes	Unclear
Was the loss to follow-up after baseline 20% or less? Were those lost to follow-up accounted for in the analysis?	Yes	Yes	Yes
Did the statistical methods examine changes in outcome measures from before to after the intervention? Were statistical tests done to provide p values for the pre-to-post changes?	Yes	Yes	Yes
Were outcome measures of interest taken multiple times before the intervention and multiple times after the intervention (i.e., did they use an interrupted time-series design)?	No	No	No

If the intervention was conducted at a group level (e.g., a whole hospital, a community, etc.), did the statistical analysis take into account the use of individual-level data to determine effects at the group level?	No	No	No

Table 5. Quality appraisal for qualitative study using JBI guidelines

JBI critical appraisal for qualitative study	Studies		
	Rangel et al	Fisher & Crawley	Ashby et al
Is there congruity between the stated philosophical perspective and the research methodology?	Yes	Yes	Yes
Is there congruity between the research methodology and the research question or objectives?	Yes	Yes	Yes
Is there congruity between the research methodology and the methods used to collect data?	Yes	Yes	Yes
Is there congruity between the research methodology and the representation and analysis of data?	Yes	Yes	Yes
Is there congruity between the research methodology and the interpretation of results?	Yes	Yes	Yes
Is there a statement locating the researcher culturally or theoretically?	No	No	No
Is the influence of the researcher on the research, and vice- versa, addressed?	No	No	No
Are participants, and their voices, adequately represented?	Yes	Yes	Yes
Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	Yes	Yes	Yes
Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?	Yes	Yes	Yes

Study Characteristics

The study characteristics are summarised in Table 6. Of the 24 studies included, 8 were cohort studies, 6 were cross-sectional studies, 3 were qualitative studies, 4 were randomised control trials and 3 were pre-test post-test interventional studies.

Table 6. Defining the identified papers: Author & Year, Participants, Methods, Treatment approach, Key findings.

Author & Year	Participants	Methods	Treatment Approach	Key Findings
Jason et al., 2020.[19]	10,119 youth aged 5–17 from 5622 households	Prevalence study	No treatment strategy reported	The prevalence found in this study is 0.75%. And only 5% had been diagnosed with CFS previously. African American and Latinx reported high prevalence.
Nijhof et al., 2011.[20]	Adolescents aged 10 to 18 years.	Prevalence study	No treatment strategy reported	The prevalence found to be 111 per 100000 adolescents. The incidents reported as 12 per 100000 adolescents per year
Crawley et al., 2012.[21]	5657 children who had chronic disabling fatigue at age 13.	Cohort study	No treatment strategy reported	Early family adversity was found to have an association with the presence of CFS at the age of 13. And it is getting reported to health care services.
Collin et al., 2015.[12]	5657 Children aged 13 years	Cohort study	No treatment strategy reported	Maternal anxiety, maternal depression, child psychological problems, and upsetting events were associated with chronic disabling fatigue.

Author & Year	Participants	Methods	Treatment Approach	Key Findings
R.M Viner et al., 2008.[22]	A total of 1880 adolescents aged 11 to 12 years and 13 to 14 years.	Cohort study	No treatment strategy reported	Mental health was found to have a significant impact on the presence of persistent fatigue.
Crawley & Sterne, 2008.[23]	Children aged under 18 years	Cross-sectional study	No treatment strategy reported	Only 62% of children with CFS attended 40% of school. School absence is associated with worse physical function.
Farmer et al., 1999.[24]	670 twin pairs	Cohort study	No treatment strategy reported	The result shows the influence of genes in the CFS
Josev et al., 2017.[25]	166 adolescents aged 13 to 18 years	Cohort study	No treatment strategy reported	Adolescents with CFS show poorer sleep quality when compared to healthy subjects.
Sankey et al., 2006.[26]	28 children aged 7 and 17	Cohort study	No treatment strategy reported	The result shows increased absenteeism before the diagnosis.
Rangel et al., 2000.[27]	50 children	Qualitative study	No treatment strategy reported	The illness had a handicapped effect on affected children and two third of the children recovered and returned to normal life
Fisher & Crawley, 2012.[28]	11 children aged 12-18	Qualitative study	No treatment strategy reported	Children reported social loss and uncertainty after the onset of CFS. And the recovery is influenced by individual differences.
Al-Haggar et al., 2006.(29)	92 children aged 10-14 years	Randomised control trial	Biofeedback and cognitive behavioral therapy	After intervention, increased school attendance and symptom reduction was found in participants.
Lim & Lubitz, 2002.[30]	59 Adolescents	Pre-test post-test interventional study	Multidisciplinary inpatient programme.	Improvement in physical activities and school attendance.
Ashby et al., 2005.[31]	Children and parents	Qualitative study	Family based active rehabilitation model	Family values this approach and find improvement in all addressed areas.
Gordon A et al., 2010.[32]	22 adolescents	Randomized controlled trial	Graduated exercise training and progressive resistance training	Both groups exhibit notable improvements in their physical capabilities and overall quality of life. However, the only exercise that will alleviate depressive symptoms is aerobic training
Gordon & Lubitz, 2009.[33]	16 adolescents	Pre-test post-test interventional study	Exercise training	A noticeable change in physical capacity of upper body. The number of push ups increased by 70%. Fatigue severity and depression index also improved by 13% and 42% respectively.
Lloyd et al., 2012.[34]	63 children aged 11–18-years	Pre-test post-test interventional study	Family based cognitive behavioural therapy	Participants who received intervention showed increased school attendance, decrease in fatigue severity.
Nijhof et al., 2013.[35]	112 Adolescents	Randomised control trial	Cognitive behavioral therapy	Adolescents were no longer suffering from CFS. Most

Author & Year	Participants	Methods	Treatment Approach	Key Findings
				adolescents who recovered immediately following FITNET treatment were still recovered at LTFU.
R. Viner et al., 2004.[36]	46 children aged 9–17 years.	Randomised control trial	Supportive care, Graded activity, exercise programs and family sessions.	The program group had significantly higher wellness scores and attendance records at school. After the program, 43% of individuals had fully resolved their CFS/ME.
Haines et al., 2005.[37]	5 to 19 years old children	Prevalence study	No treatment strategy reported	Reported 0.006% prevalence in paediatric population
Collin et al., 2016.[38]	Parents and children of 16 years	Cohort study	No treatment strategy reported	Family adversity and gender found to be a risk factor
Bakken et al., 2014.[39]	5 years old	Prevalence study	No treatment strategy reported	Sex and age specific factors may act as a risk factor for the onset of CFS.
Van de putte et al., 2006.[40]	40 adolescents	Cross sectional study.	No treatment strategy reported	Mothers of children with CFS also showed symptoms like fatigue and psychological disturbances.
Knight et al., 2018.[41]	66 participants ages 13- 17 years	Cohort study	No treatment strategy reported	Participants with CFS reported an increased risk of school absenteeism and lack of social and emotional functioning.

Prevalence

The overall prevalence rate was 25.8 per 100,000 persons which is reported by a population-based study in Norway[39]. A postal survey of British general practitioners' pediatric surveillance unit placed the prevalence at 0.006%, a prevalence equating to 111 per 100,000 adolescents.[20] Research in a UK hospital setting found a prevalence of 0.06% to 1%. In primary care, the incidence of 62 per 100,000 is likely an underestimate, with health professionals reporting 47.9 per 100,000. This is significantly lower than self-reported community surveys, which report a prevalence of 570 per 100,000.[37] A community-based study in Chicagoland reported a prevalence of 0.75%, with a higher percentage being African American and Latinx than Caucasians[18]. A study in Great Britain found a prevalence of ME/CFS of 1900 per 100,000, which is 1.86% among 16-year-olds.[37]

Risk factors

A population-based study in Norway reported that females have a higher risk of CFS during late adolescent age and no gender difference was found in children under 12. The incidence rate ratio for women compared to men is 3.2, with the highest occurrence rates found in the age groups of 10 to 14 and 15 to 19.[38] Another study conducted in the UK also stated female (2.39% girls and 1.60% boys) gender is a risk factor for adolescents aged 16 and above but not in the case of children under 13 years old.[37] Maternal anxiety and depression put children at a 5.6 times higher chance of developing CFS and childhood psychological problems have been reported.[11,21,39] Low economic status is also reported to contribute to the development of CFS in the pediatric population.[26]. A family history of CFS has been identified as a risk factor for developing CFS in the pediatric population by cross-sectional research, the study reported that 20% of participants

have a family history of CFS.[22] The genetic heritability of CFS in monozygotic and dizygotic twins is also mentioned in one twin study.[23]

Impact in life

CFS significantly impairs various aspects of children's lives, including physical functioning, education, academic performance, and participation in extracurricular activities.[24] Children with CFS were found to be absent from school and children who are taking specialist services attended 40% or less of the school days.[25] According to a retrospective period prevalence survey, CFS accounts for 42% of medically confirmed long-term illnesses.[26] Being bedbound due to poor physical functioning is closely associated with school absences.[22,26] The symptoms lead to role limitations and social restrictions related to both physical and overall health.[9] These restrictions in social functioning are associated with an impact on emotional functioning[40], and physical restrictions cause social withdrawal in children, and lead to a decline in physical capacity resulting in a lower standard of living.[37] The social withdrawal caused by CFS is altering how the children interact with their friends, family, and peer groups.[27] Children with CFS tend to be more emotionally and practically dependent on their families compared to their peers, which hinders their ability to develop independently.[26] Additionally dealing with a restrictive body causes low mood, and frustration and makes them more fragile and vulnerable to emotional breakdowns.[27.]

Management

An 18-month intervention research demonstrated the significance of biofeedback-assisted cognitive behavioural therapy. The experimental group saw a noticeable improvement in their symptoms, it decreased by 23.1%, attendance at school increased by 31.5%, and improvement in the general quality of life.[28] A multidisciplinary in-patient program involving 59 adolescents reported improvements in their physical activity and school attendance in 78% of the participants.[29] A study conducted in a community-based CFS management program, including the family in the treatment plan reported an increase in the effectiveness of the treatment technique.[30] Patients' physical capabilities and standard of living were reported to have improved in 28% of participants in a randomized controlled pilot study that investigated the efficacy of aerobic graded exercise and progressive resistance training in CFS.[31] Gradual exercise therapy alone reduced depression by 42% and fatigue intensity by 13% while increasing aerobic capacity.[32] According to a non-randomized cohort study involving telephone-based self-help for adolescents with CFS, symptoms decreased and school attendance increased after six months. Additionally, 71.4% of participants reported global improvement and satisfaction.[33] For children with CFS, one internet-based therapy with long-term follow-up was reported to be temporarily effective. A multidisciplinary rehabilitative treatment that included graded activities/ exercise programs, family sessions, and supportive care reported significantly higher wellness scores and reduction in severity score., 43% had complete resolution of CFS/ME compared to only 4.5% of those having supportive care alone.[35]

DISCUSSION

Childhood is a crucial stage of human development, and any disruptions during this period can have lifelong effects. CFS has the potential to disrupt normal life. This scoping review aimed to examine the

empirical literature on the prevalence, risk factors, impact on daily life, and management strategies associated with CFS.

Prevalence

The prevalence of pediatric CFS reported in various studies represents a complex and multifaceted picture. Research utilizing similar methodologies has shown a wide range of prevalence rates.[41] One salient factor for varying prevalence rates is because of the unaddressed common diagnostic criteria for this condition. The methods employed in different studies, such as postal surveys, hospital-based research, and community surveys, and the diagnostic criteria used can influence the prevalence estimates. This variability can be because of different population characteristics, cultural factors, and healthcare access.[42] Studies on adult populations show diversity in prevalence based on ethnicity.[43] So ethnically diverse studies will help to address the geographical differences in pediatric CFS. Therefore, it is unknown how common CFS in children is. This result highlights the importance of agreed-upon diagnostic criteria for CFS in pediatric patients and to understand.

Risk Factors

CFS may arise under specific conditions. Despite its prevalence and severity in children, understanding of the contributing factors remains limited. Key risk factors identified include genetic traits, premorbid childhood challenges, maternal prenatal conditions, and social adversity. The higher prevalence rates in females and the 10-14 and 15-19 age groups coincide with puberty and significant physiological changes. Hormonal fluctuations, stress from academic and social pressures, and emerging psychological issues may contribute to increased susceptibility to CFS during these developmental stages.[5,44] So, investigating the biological and/or social reasons behind the potential gender difference in pediatric CFS is needed. Also, the association between maternal anxiety, depression and childhood psychological problems with CFS underscores the importance of mental health factors. The association between maternal anxiety/depression and childhood psychological problems lacks clarification regarding causality. None of the studies clarifies whether these factors predispose adolescents to CFS or arise because of the illness. Conducting longitudinal studies will help to understand the direction of causality between psychological factors and CFS development. The association between socioeconomic status and CFS is highlighted, it can be because of the limited access to health care and can contribute to stress and psychological distress, which may in turn increase susceptibility to the condition.[45] But the research does not delve into how particular social adversities like violence, and inadequate parenting can contribute to the development of CFS.[43] Exploring how social adversity might influence adolescents' susceptibility to CFS at different developmental stages will help to understand the social factors involved.

Impact

In pediatric CFS, children are affected by CFS at their crucial developmental stage. The effects of CFS are diminishing a child's prior personal, social, and academic activities. Numerous facets of children's lives are greatly hampered by the existence of CFS, including physical functioning, schooling, academic performance, nonscholastic activities, etc.[24] Studies have mentioned the limitations in mobility and activities of daily living[23], and also added increased school absence and fatigue which affect the academic performance[26]. They also reported increased social loss and social and separation anxiety[28]. The fact that CFS might impede a child's development and its effects on children's lives should be

seriously considered. Their chances of being unemployed and being financially dependent as adults will rise as a result.[46] Consequently, children with CFS might live under more stigma and mistrust. Further investigation of the physical health outcomes of the condition is required to fully comprehend the severity and potential impairment that CFS can have on children. There is a need to conduct more research to understand the interplay between physical and psychological challenges. The impact of pediatric CFS on social life is underexplored, more studies are needed to address how this condition affects children's relationships and social activities.

Management

There is no currently approved treatment for CFS as per NICE guidelines and previous studies.[2] Sometimes it is possible to control or reduce the symptoms that are present. Since the illness has multiple dimensions, a comprehensive strategy will be required to reduce the symptoms. The efficacy of treatment for CFS in the pediatric population is less explored. Further studies with a larger population will be needed to fully determine the effectiveness of CFS treatment in children.

The findings of this scoping review should be viewed considering its limitations. The data used for this research were only from the Scopus and PubMed databases. The search only included articles published in English, so the excluded studies may have relevant information for the objective of this review. Additionally, most of the studies selected for the review were carried out in Western nations, and the small number of studies from developing nations may have limited the results' capacity to be applied to other contexts.

Implication and Recommendation

In summary, the complexities of CFS in pediatric populations require increased focus and investigation. Variations in prevalence rates underscore the necessity for standardized diagnostic criteria to effectively gauge the true impact of CFS in children. Additionally, exploring the interactions of risk factors, including genetic predispositions and social challenges, is crucial for formulating targeted prevention and intervention strategies. Also, future studies that focus on the direction of causality between psychological factors, maternal factors, and CFS development are needed. Looking ahead, a comprehensive treatment approach, guided by in-depth research, is essential to mitigate the substantial effects of CFS on children's physical, social, and academic lives. Healthcare providers must take a comprehensive approach, considering physical, social, emotional, and developmental factors, while prioritizing managing physical symptoms that significantly affect daily activities. To establish national guidelines for pediatric CFS, collaboration between policymakers and healthcare professionals is essential, emphasizing tailored care approaches. Public health efforts are also necessary to educate teachers, healthcare workers, and the general public to reduce stigma and encourage early diagnosis. Financial and emotional support policies, including care allowances and respite services, are vital to relieve the pressure on families. Furthermore, boosting funding for research and focusing on CFS initiatives in developing countries are key steps to addressing global inequalities in care and understanding of the condition.

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