

Research Article

Relationship Between Adverse Childhood Experiences, Childhood Obesity And Risk of Colorectal Cancer in Adulthood: A Systematic Review

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Abstract

Background: Adverse childhood experiences are traumatic incidents occurring before the age of 18 years that increases the risk of adult health problems. Such experiences include various types of abuse; physical and emotional neglect; separation between parents; serious household dysfunction; peer violence and community violence.

Objective: To determine the risk of colorectal cancer in persons in adult life with exposure to early life trauma. To find relation between adverse experiences in childhood and early life obesity.

Methods: This systematic review was conducted according to PRISMA guidelines 2020. In this review, 5 independent reviewers extracted the data based on the articles published between 2018 and 2023 with the help of Databases such as PubMed/ Medline and Google Scholar. In each database, keywords used were: Adverse Childhood Experiences And Childhood Obesity, Adverse Childhood Experiences OR Childhood Obesity AND Colorectal Cancer, Childhood Obesity AND Colorectal Cancer. Studies reported any relationship between adverse childhood experiences or childhood obesity and adulthood colorectal cancer were selected..

Results: A total of 22 articles were identified. Out of these 13 (59.1%) explained the positive relationship between adverse childhood experiences and the development of childhood obesity (increased BMI). The most common childhood adversities related to increased childhood BMI are Household dysfunction, crime proximity, neglect, bereavement, and abuse. There were 9 (40.9%) of the 22 identified articles proved a direct relation between childhood obesity and the development of colorectal carcinoma.

Conclusion: Necessary steps must be taken to raise awareness about adverse childhood experiences such as abuse and community-related issues children face and prevent such risk factors from increasing the overall risk of Colorectal Carcinoma, thus alleviating the burden on the health system and provide wellness to the society as a whole.

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Introduction

Adverse childhood experiences (ACEs) are the exposure occurring before the age of 18 that increase the risk of developing certain health problems and poor quality of life. Such exposures include various types of abuse (physical, emotional, and sexual); physical and emotional neglect; divorce/separation between parents; serious household dysfunction such as drug abuse; peer violence and community

violence.¹

Adverse childhood experiences are very common in developing countries. According to some research, there is a link between early childhood trauma and chances of developing future health risk factors such as smoking, alcohol and substance abuse, lack of physical activity, and increased body weight, as well as chronic diseases including cardiovascular, pulmonary diseases as chronic bronchitis, and cancers which are, in turn, related to already mentioned risk factors.^{2,3} Some studies have shown a direct link between the causative factor and increased risk of cancer, such as seen in physical abuse or trauma and substance misuse. Others have shown an indirect relation; a child's environment may influence the misuse of substances and unhealthy diet (leading to obesity),



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which may aggravate the risk of serious health issues that eventually lead to colorectal cancer. According to systemic analysis for the Global Burden of Disease Studies in 2019, there is an increased risk of developing colorectal carcinoma in countries with a low Socioeconomic Development Index (SDI), due to factors such as poor milk consumption, increased body weight, physical inactivity, substance abuse, cigarette smoking, and abnormal gut microbiome.⁴ There is also evidence that an increased body mass index during childhood as a result of childhood adversities may increase the chances of colorectal cancer, as seen in a study conducted by Muhammad Zeeshan.⁵ Our aim for this systematic review was to find any relation between adverse experiences during childhood and childhood obesity/Increased BMI as a risk factor for colorectal carcinoma during adult life. In our research, we found limited published data regarding ACEs and colorectal cancer in adult life in both males and females irrespective of geographical distribution.

Methods

A Systematic review was conducted. Systematic reviews are articles that integrate information from various research articles about a particular subject to synthesize data and assert the significance of results and are a great means to stay updated with recent developments as well as use them as guidelines in medical practice. The review was conducted by the Preferred Reporting Items for Systematic Review and Meta-analysis (PRISMA) guidelines.

Search Strategy

In this systematic review, 5 independent reviewers found the articles published between 2018 and 2023 with the help of Databases such as PubMed/ Medline and Google Scholar. In each database, keywords used were: Adverse Childhood Experiences And Childhood Obesity, Adverse Childhood Experiences OR Childhood Obesity AND Colorectal Cancer, Childhood Obesity AND Colorectal Cancer. MeSH Terms used for this search were: ("Adverse childhood experiences" OR "Adverse childhood experiences" OR "ACE" OR "ACEs") OR ("childhood obesity" OR "overweight" OR "BMI") AND ("colorectal cancer" OR "colon cancer"), ("Adverse childhood experiences" OR "Adverse childhood experiences" OR "ACE" OR "ACEs") AND ("childhood obesity" OR "overweight" OR "BMI").

Included Studies reported individuals who have experienced childhood adversities, any relationship between early childhood trauma and childhood obesity, and link between childhood obesity and adulthood colorectal cancer. Included articles were those published in the English language, in duration between January 2018 and February 2023, both Abstract and Full Text. Any Type of study design including cross-sectional, cohort, and reviews was included in the

study.

Studies that did not meet our inclusion criteria were excluded. Studies reported colorectal cancer due to comorbidities such as Inflammatory Bowel Diseases and relating childhood obesity to genetic factors, family history, and comorbid conditions like Diabetes Mellitus were excluded

Using PRISMA guidelines 2020, Aleena and Alia identified the articles from databases such as Google Scholar and PubMed. The initial database search results were 1580 articles. Then, Abdullah removed the duplicates. All articles identified by the search strategy were screened based on titles and abstracts by all the authors. After initial screening, eligible articles were reviewed. All authors read independently the full text of the articles.

Data is extracted based on the following criteria: Study characteristics (e.g. Author, country, and year of publication) and associations (e.g. association between adverse experiences in childhood and childhood obesity, associations between childhood obesity/BMI and adulthood colorectal cancer). For data extraction and synthesis, we use Microsoft Word software.

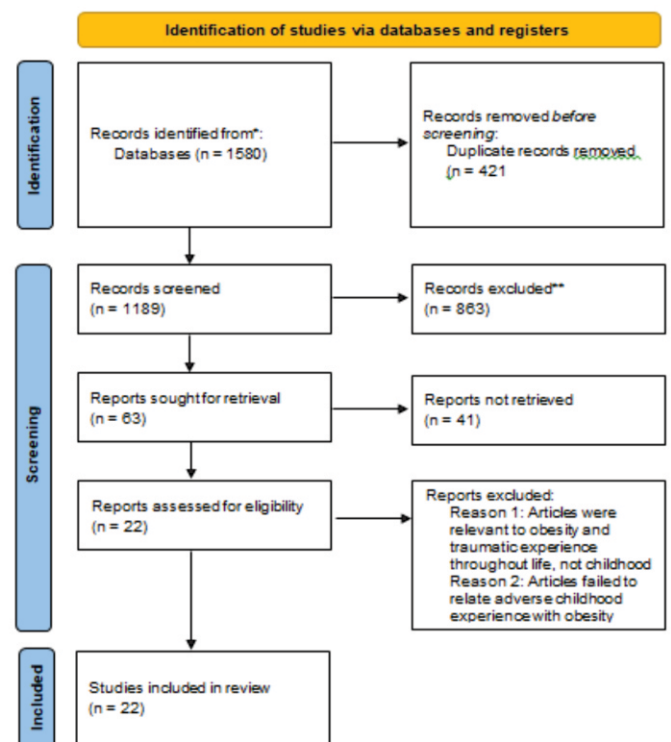


Fig.1. PRISMA flowchart for the selection of studies

Results

A total of 1580 articles were yielded from the databases: PubMed and Google scholar. After title and abstract screening and removal of duplicates, 63 articles were reviewed in full text. 41 studies were excluded for 1) not explaining childhood

obesity 2) relating adverse childhood experiences with childhood obesity 2). Finally, 22 studies fulfilled the criteria of inclusion were included in this review.

The studies were categorized based on Authors, Years of Publication and Country where they published, According to this, all the included studies were published between 2018 and 2023 and were from seven countries (United States, England, Switzerland, Germany, Iran, Saudi Arabia and Tunisia). Overall, 10 studies were cross-sectional, 10 were reviews, 1 was meta-analysis and 1 study was a case-control.

Among the other characteristics for which the articles were studied, a detailed analysis is hereby given in Table 1.

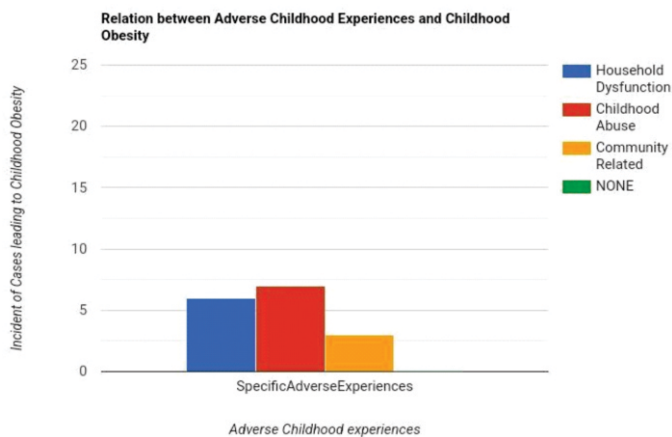


Fig.2. Relation Between ACEs And Childhood Obesity

Adverse Childhood Experiences(ACEs) And Childhood Obesity:-

A total of 22 articles were identified. Out of these 13 (59.1%) explained the positive relationship between adverse childhood experiences and development of early life obesity (increased BMI). The most common childhood adversities related to increased childhood BMI are Household dysfunction, crime proximity, neglect, bereavement, and abuse (physical, sexual, and emotional). 6 articles specified household dysfunction as an adverse childhood experience causing

childhood obesity. 7 studies linked childhood abuse (physical or sexual) to early-life obesity. 3 articles discussed community-related adverse childhood experiences and their effect on childhood BMI. Children experiencing more than one adverse childhood experience are at a greater risk of developing childhood obesity.

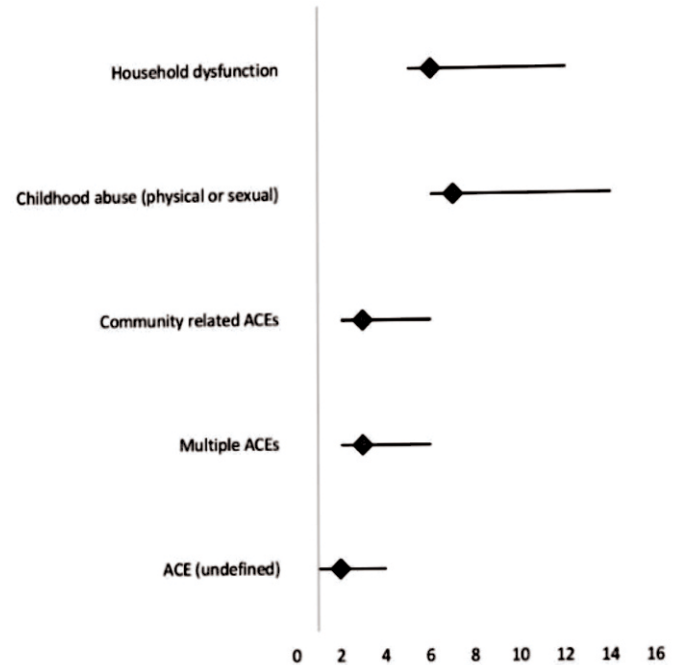


Fig.3. Forest Plot of Adverse Childhood Experiences (ACEs)

Childhood Obesity And Colorectal Cancer

9 (40.9%) of the 22 identified articles proved a direct relation between childhood obesity and the development of colorectal carcinoma in those adults. According to 1 article, every 1kg/m² increased body weight, there was a 2% increased risk of colorectal cancer. Furthermore, a BMI greater than 25kg/m² poses a greater risk in the development of colorectal carcinoma in later life.

Table 1: Characteristics Of Included Studies

Sr no.	Title	Reference	Place	Study Design	Type of ACE	Childhood Obesity/ BMI	Colorectal Cancer
1	Childhood Obesity and Cancer Risk in Adulthood.	Weihe et al., 2020 ⁶	USA	Review article	-	Higher Body mass index during childhood and adolescent age	Increased risk for several cancers in adulthood, including blood cancers, GIT cancer(colorectal cancer), and breast cancer
2	Childhood obesity: increased risk for cardiometabolic disease and cancer in adulthood.	Weirauch-Biüther et al., 2019 ⁷	USA	Review article	-	Childhood obesity	Risk of cancers of the endometrium, kidney, GIT such as Colon and esophagus (adenocarcinoma) and postmenopausal breast cancer

3	Development and Validation of the Weighted Index for Childhood Adverse Conditions (WICAC).	Jacobsen et al., 2022 ⁸	Switzerland	Meta-analysis	All categories: 1. All types of abuse 2. Neglect 3. Household dysfunction 4. Community related factors 5. Disaster bereavement, loss, injuries	ACE can cause high childhood BMI	Increased risk of Cancer, CVS disorders, BMI, obesity, Anxiety, Depression
4	Examining the influence of positive childhood experiences on childhood overweight and obesity using a national sample.	Crouch et al., 2022 ⁹	USA	Review article	Children experienced two or more ACEs (not safe neighborhood and non-resilient family)	High childhood BMI	-
5	Family resilience and childhood obesity among children exposed to adverse childhood experiences in a national survey.	Heerman et al., 2022 ¹⁰	USA	Review article	ACEs: (1). food or housing insecurities (2). parental divorce or separation (3). death of parents (4). Parental crime (5). domestic violence (6).neighborhood violence (7). household mental illness (8).substance abuse (9). Racial discrimination	High childhood BMI	-
6	Featured Article: Community Crime Exposure and Risk for Obesity in Preschool Children: Moderation by the Hypothalamic-Pituitary-Adrenal-Axis Response.	Gartstein et al., 2018 ¹¹	USA	Review article	ACE (crime proximity)	High childhood BMI	-
7	Colorectal cancer risk factors in north-eastern Iran	Goshayeshi et al. 2019 ¹²	Iran	Cross-sectional Study	-	Increased BMI	The Coefficient of correlation between CRC and increased BMI is +1.5
8	Early-life obesity and adulthood colorectal cancer risk	Garcia And Song (2019) ¹³	USA	Review Article	-	Increased childhood Body mass index	39% increase risk of CRC in adult male and 19% in adult female
9	Excess Body Weight and Gastrointestinal Cancer Risk.	Scherübl (2021) ¹⁴	Switzerland	Review Article	-	Excess body weight >25kg/m ²	Colorectal cancer is associated
10	Excessive Body Fat at a Young Age Increases the Risk of Colorectal Cancer	Lei et al (2021) ¹⁵	USA	Review Article.	-	Higher BMI at a younger age before 20 years	Overweight and obese young individuals have a relatively increased risk of colorectal cancer as compared to normal
11	Adverse Childhood Experiences and Weight Status among Adolescents	Davis et al (2019) ¹⁶	USA	Cross-Sectional study	Self-reported ACE	1.4 times as likely to be obese compared with their peers with no ACEs	-
12	Association between cumulative exposure to adverse childhood experiences and childhood obesity	Pursawani et al. (2020) ¹⁷	USA	Cross-sectional study	High ACE exposure.	Increased odds of obesity	-
13	Adverse childhood experiences and obesity: Systematic review of behavioral interventions for women	MacDonnell (2018) ¹⁸	USA	Review Article	Childhood abuse and trauma.	Associated with obesity	-

14	Risk of Colorectal Cancer Associated With Lifetime Excess Weight.	Lei et al. (2022) ¹⁹	Germany	Case-Control Study	-	Each SD increment in weight	Increase of colorectal cancer risk by 55%.
15	The Impact of Body Mass Index on the Clinicopathologic and Prognostic Factors of Colorectal Cancer in Saudi Arabia.	Aldaqaal (2020) ²⁰	Saudi Arabia	Cross-sectional study	-	Increase body weight	Colorectal cancer Stage IV disease.
16	Adverse Childhood Experiences and Obesity: A One-to-One Correlation?	Mahmood (2022) ²¹	USA	Cross-sectional study	Trauma and household dysfunction	Positive relationship with BMI.	-
17	The association between adverse childhood experiences and childhood obesity: A systematic review	Schroeder et al. (2021) ²²	USA	Systematic review	Sexual abuse	Childhood obesity risk	-
18	Association of ACEs including low household income with obesity among Japanese adolescents	Doi et al. (2022) ²³	Switzerland	Cross-sectional	Financial difficulties, peer isolation	No association	-
19	Association between obesity and ACEs in the US	Kyler et al. (2021) ²⁴	USA	Cross-sectional	Food/housing insecurity, parental divorce, physical violence	Risk of Obesity	-
20	Childhood exposure to violence is associated with risk for mental disorders and adults' weight status community-based study in Tunisia	El mhamdi et al. (2019) ²⁵	Tunisia	Cross-sectional	Social ACEs	Childhood obesity in women > than man	-
21	Childhood poly-victimization is associated with Elevated BMI and blunted cortisol stress response in college women	Christie, Matthews (2019) ²⁶	England	Cross-sectional	Physical and sexual abuse, peer violence, intimate partner violence, community violence	Higher BMI	-
22	Family resilience and childhood obesity among children exposed to ACE in a national survey	Herman, William J (2022) ²⁷	National survey	Cross-sectional	Family resilience	Higher BMI	-

The above results showed adverse childhood experiences increased the risk of colorectal carcinoma in adult life by affecting childhood BMI.

Discussion

The findings in this systemic review indicate an indirect relationship between ACEs and the risk of colorectal carcinoma. ACEs result in childhood obesity which is strongly associated with colorectal cancer in adulthood. Studies in this review have indicated that early childhood obesity (increased childhood BMI) leads to the risk of development of colorectal carcinoma at 39% in males and 19% in females

during adult life.¹³ The coefficient of Correlation between colorectal carcinoma and BMI is +1.5 higher.¹² BMI of >25kg/m² causes development of colorectal carcinoma.¹⁴ Globally colorectal cancer is the second major cause of death with Risk factors of obesity, physical inactivity, etc. Hence, effective interventions are needed in this regard.

In this review, we have discussed the relationship between different types of childhood adversities and childhood obesity. In our study, we have also highlighted the link between community-related early childhood trauma and childhood obesity, aiming to shed light on the potential role of community factors in contributing to this prevalent public health issue. Adverse childhood experiences, like neglect,

abuse, or household dysfunction, have been extensively studied and shown to have profound and lasting impacts on physical and mental well-being of children.² Studies have found that exposure to adverse community factors, such as limited healthy food availability, lack of safe outdoor places for physical activity, and high levels of neighborhood violence, can significantly increase the risk of childhood obesity.^{23,24,26} By uncovering the associations between community-related ACEs and childhood obesity, our study contributes to the growing body of evidence emphasizing the importance of addressing not only individual-level but also community-level determinants in combating childhood obesity and promoting overall child well-being.

According to this review, another type of ACE that is linked to obesity is abuse. In a study conducted amongst adults who reported early life abuses were more likely to have increase body weight, all four types of abuse were significantly related to obesity. However, some studies have shown to portray this image as otherwise. Recent research has shown that the effect of ACEs such as childhood abuse on the development of early life obesity may take 2 years to 5 years to manifest.²² Moreover, it has been seen that the chances of obesity were increased in neglected children, rather than solely based on childhood abuse.¹⁸ In addition to other social and economic risks, exposure to sexual and physical abuse in early life may increase the chances of obesity later in life, however more common in females than males.²² Understanding the connections between early life trauma and obesity can aid in the establishment of effective strategies to improve the health outcomes of affected individuals.¹⁸

In our study, we have also mentioned that household dysfunctions such as peer violence, low household income, household drug or alcohol abuse, parent separation or divorce, and housing/food insecurities are associated with an increased risk of obesity before the age of 18 years. Children of families with low household incomes are more prone to obesity and respiratory issues at earlier ages.²⁷ Economic hardships due to family dysfunction or maltreatment are indirectly associated with obesity.²⁸

By revealing the relationship between childhood abuse of different types and childhood obesity, our study establishes the increasing evidence needed to emphasize the importance of dealing with cases of abuse to address the concerns of childhood obesity that can lead to cancer. The international forum is paying attention to the prevention of ACEs due to their lifelong negative impacts on health. Meanwhile, further information is required to provide reliable statistical data for planning effective interventions for preventing childhood adversities. Many agencies have already contributed to control ACEs such as maternal and infant home visitation

(MIECHV); parenting services; and early intervention programs.

Although this systematic review provides the information regarding effect of ACEs on colorectal cancer development, there are certain limitations to this study. Firstly, meta-analysis is not done. Secondly, limited studies are included in this review. RCT is not included. Thirdly, no quality assessment is done. Hence, there may be risks of different types of bias. Childhood obesity and colorectal cancer were self-reported in most cases. No specific tool or test is used to diagnose colorectal cancer and childhood obesity. The frequency and duration of ACEs is also unknown in many studies. ACEs cause colorectal cancer in most cases by increasing childhood body weight. Therefore, further studies are needed to find a direct relation between adverse childhood experiences and colorectal cancer. Quality assessment should be done to minimize the risk of bias.

Conclusion

Necessary steps must be taken to raise awareness about adverse childhood experiences such as abuse and community-related issues children face and prevent such risk factors from increasing the overall risk of Colorectal Carcinoma, thus alleviating the burden on the health system and provide wellness to the society as a whole.

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Authors' Contribution

All the authors contributed equally in accordance with ICMJE guidelines.

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