

Impact of Child Abuse & Neglect on Children: A Review Article

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Abstract:

Objectives: This review paper aims to discuss and encompasses a variety of experiences that are threatening or harmful to the child and the result of acts of commission or omission on the part of a responsible caretaker.

Materials and Method: Authors performed a brief PUBMED literature search on the effect of child abuse and neglect using "Medical Subject Heading (MeSH)" terms, "child abuse and neglect," "short term and long term consequences," "stress responses," "gene polymorphism." Also, Authors screened websites and local guidelines.

Results: The literature search provided only limited data on specific papers relating to the clinical diagnosis and consequences of child abuse and neglect. Evidence from these published studies indicates that child maltreatment causes traumatic stress, which disrupts homeostasis causing both immediate and long-term endocrine changes in metabolism and neurophysiology. It induces acute stress in victims to increase chances of developmental problems during childhood, adolescence, and adulthood.

Conclusion: Child abuse and neglect have strong long-term associations with adult health risk behaviors and diseases.

Key words: altered functions, child abuse and neglect, HPA axis, long-term consequences, Review.

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INTRODUCTION

Child abuse is defined as the nonaccidental injury, sexual abuse, emotional abuse or trauma inflicted on a minor by a parent or other caregiver. Child neglect is defined as "when a caregiver fails to provide those basic human needs that are necessary for a child/youth to grow into a healthy adult."¹ It can be as "Actual abuse" or "Probable abuse" depending on presentation. "At risk" indicates a child in danger of abuse or neglect or both, that is recognized by others or by the family itself.^{2,3} It includes maltreatment of a child less than 18 years of age by a person responsible for the child's welfare encompassing a broad spectrum of abuse and neglect scenarios that can be classified in seven subtypes: physical or sexual

abuse, physical neglect, lack of supervision, emotional and / or educational maltreatment and moral-legal maltreatment. [Fig - 1 shows Schmitt's Classification of child abuse and neglect].^{4,7}

This review aims to discuss and encompasses a variety of experiences that are threatening or harmful to the child and the result of acts of commission or omission on the part of a responsible caretaker. It also discusses short and long-term consequences of child maltreatment with its impact on children, adolescents as well adults.

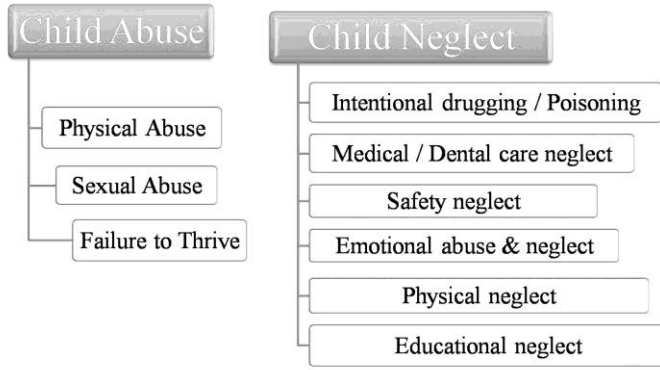


Fig. 1 - Schmitt's Classification of child abuse and neglect

Incidence of child abuse and neglect

Adults abuse children, but investigators / clinicians do not pick the signs, partly because of ignorance, and partly because we did not want to believe that such things can happen. Adults abuse or neglect children at all ages, but the majority of cases occur in younger children. The investigators have not yet established actual incidence of abuse, neglect, and deprivation. However, because of the difficulty of estimating a number of unreported and undocumented cases, the actual frequency is probably much higher. Data shows that boys outnumbered girls slightly in a majority of situations except in an age group over 15 years, where females were most likely to be assaulted. Winship⁹ reported that parents are most likely to be abusers, with the mother being implicated in 50% of cases. [Fig. 2 - shows the percentage of abusers involved in child abuse and neglect.]

Fig. 2 - Percentage of abusers involved in child abuse and neglect

However stepparents, foster parents, relatives and even siblings may also be offenders. Poor support from spouse or partner seems is also a factor. Researchers have also suggested that a teenager, being single, and at a low socio-economic group produces high risk for child abuse. They also observed that abuse is more easily detected in a low socio-economic group of people, whereas in people in higher socio-economic strata are more sophisticated in their ability to hide it, or might resort to psychological rather than physical abuse.¹⁰

Table 1, shows data given by National study of the incidence and severity of child abuse and neglect, of total 6, 52,000 substantiated cases from May 1, 1979, to April 30, 1980, with incidence of 10.5/1,000.⁴

Table 1 - Incidence and severity of child abuse and neglect in year 1979 – 1980

Type of child abuse	Percentage of occurrence
Physical abuse	31.8%
Educational neglect	27.8%
Emotional abuse and neglect	26.3%
Health (medical) care neglect	8.7%
Physical neglect	7.8%
Sexual abuse	6.8%
Failure to thrive	4.0%

(Data given by National study of Incidence and Severity of child abuse and neglect)⁹



Materials and Method

Rational -

This review evaluates literature-based evidence to determine the effect of the complex process of child abuse depending on their circumstances and child's environment. Adverse childhood experiences have strong long-term associations with adult health risk behaviors, health status, and diseases.

Focused question-

The authors addressed following question in this review: "Children who experienced abuse or neglect as a result of substance, economic problems or acts of commission or omission through caretaker, what is the effect of short and long-term consequences of child maltreatment and its impact on children, adolescents as well adults?"

Search protocol -

Data search and search strategies

Authors conducted PUBMED literature search using the following Medical Subject Heading (MeSH) terms: ('child abuse and neglect' [Subheading] or 'child abuse and neglect' [All Fields] or 'child abuse and neglect' [MeSH Terms]) and ('short term and long term consequences' [Subheading] or 'short term and long term consequences' [All Fields] or 'short term and long term consequences' [MeSH Terms] or ('stress responses' [subheading] or 'stress responses' [All Fields] or 'stress responses' [MeSH Terms] or ('stress' [All Fields] and 'responses' [All Fields]) or 'stress responses' [All Fields]). Authors also explored variations to the above MeSH terms, other terms such as 'stress responses' and 'gene polymorphism' as substitutes.

Authors also conducted a search of MEDLINE, the Cochrane Central Register of Controlled Trials, and a web of science up to March 2012 confining the reviews and all associated searches to studies published in the English language. Authors searched the MEDLINE and Cochrane Library database from 1950 till March 2012 using the above mentioned Medical subject headings (MeSH). Following completion of MEDLINE- and Cochrane-controlled trials registry searches and web of science, authors conducted a supplementary search in each of this database using 'Google search' and 'Open J-Gate' to include child maltreatment with or without short and long-term consequences, to assure consistency with the study protocol.

A total of 98 published papers were identified addressing the child maltreatment and its effect on child, adolescents and adults showing short and long-term consequences. Two independent reviewers examined relevant studies (PTD, YJK) to the specific question posed in this review and based on that

included titles and abstracts of studies which fulfilled the inclusion criteria.

Inclusion criteria -

1. Studies included were randomized, double-blinded, placebo-controlled clinical trials in humans
2. Publication in peer-reviewed international journals published in English
3. Studies with clearly stated objectives of the research and hypothesis to be tested
4. Published papers showing the MeSH terms such as 'child abuse and neglect' and 'Short term and long-term consequences' in the title of the publication

Exclusion criteria -

Authors excluded the studies which do not fulfill the inclusion criteria; non-randomized clinical trials without placebo-controlled trials, case reports, and split mouth designs.

Clinical patient outcome -

The primary outcome measured included changes in the physical, mental and emotional health of an abused child resulting in consequences from mild to severe; that last from a short period to lifetime affecting the child physically, psychologically, and behaviorally or combination of all three ways.

Data collection and analysis -

Initially, two independent reviewers (PTD, YJK) screened all the titles and abstracts of studies identified by the previously described search strategies, to include in the review. Then they reviewed selected studies independently using the criteria defined above and applied study selection criteria to a subset of relevant studies to calibrate the reviewers and to offer practical application of the selection criteria.

Quality assessment and ranking of studies -

The methodology quality of the studies was evaluated on by modifications made in CAMARADES criteria.⁵

Primary quality criteria -

1. Clear objectives and methodology of the proposed study
2. Randomization to treatment or control
3. Masked assessment of outcome
4. Exclusion of patients with syndromes, pregnant, and lactating mothers
5. Dosage and duration of drug
6. Toxicity/side effects evaluation of drugs
7. Sample size adequacy

Secondary quality criteria -

1. Publication in peer-reviewed journal
2. Statement of compliance with regulatory requirements
3. Statement regarding possible conflicts of interest. Each quality criteria carried a score of one point for a possible total of 10 points. Authors graded studies as high quality = when studies meet all primary and secondary criteria; High moderate quality - > 4 and < 8 when studies meet primary criteria and all secondary criteria. Low moderate quality = > 4 primary criteria and ≥ 1 secondary criteria does not meet; Poor quality = ≤ 4 primary criteria and all secondary criteria meet. Very poor quality = ≤ 4 primary criteria met and ≥1 secondary criteria does not meet.

Results of Three included Studies -

Study selection and description: The MEDLINE and CENTRAL literature searches resulted in 98 hits. After the first selection step based on the title of the collected studies, authors included 36 articles for further analysis. Based on the abstract screening, authors found 12 studies out of which only three studies completely fulfilled the inclusion criteria excluding nine at the last step. The articles that

remained after the third selection (n = 3) are presented in Table 2.

Of these selected studies, Lynch and Roberts assessed effects of bonding failure and development of child abuse if not properly taken care. Felitti, Anda et al. in their study revealed a relationship between childhood abuse and household dysfunction leading to an adverse childhood experience (ACE) ultimately resulting as the leading causes of deaths in adults. Dube, Anda et al., through their study revealed a strong dose relation response existing between adverse childhood experiences and risk of attempted suicide throughout the life span.

Factors responsible for child abuse and neglect

Many factors, most common of which is substance abuse, influences child abuse or maltreatment.⁵ Other contributory factors associated with it include drug and alcohol abuse, economic problems or poverty, unemployment, marital problems, stress, lack of family support networks, the cyclic problem of abuse as learned behavior, likely maltreated during their childhood and the stressors imposed by modern urban life on family, especially when parents have meager coping ability.^{4,5} The stresses that we may find in people's lives may be the precipitating causes of injury to children if the background is conducive to such behavior.⁹ One more entity that can be included in this category is "bonding failure" that describes the failure to develop parent-child love. And when this happens a child is at risk of abuse.¹¹

Table 2 - Abstracts included after text screening that fulfilled inclusion criteria of child abuse and adult health risk behaviors

Reference	Patient group	Study level	type	Methods	Key results	Comments

		of evidence			
Lynch MA, Roberts J ^[11]	N= 50, - Children 4 subgroups - Actually abused - 23, Probably abused - 3, Neglected child - 6, At risk - 18 Control group - 50, Live child born after each index child at maternity hospital.	Information on - social class, Family size, Mother's age, Obstetric, medical, psychiatric and social history.	Comparison between both groups was done.	Social class - IV, V, unemployed father, unsupported mothers - abuse seen more. Mother age < 20 yrs- occurrence of abuse more Sex of child - no significant findings Complication sin pregnancy - more the complications , more is abuse Emotional disturbances - emotionally disturbed mother tend to abuse their children more than normal mothers.	Factors with described here are responsible for causing bonding failure between child and parents that makes the child at risk of abuse. If these sign of bonding failure are recognized early then measures can be taken to prevent abuse.
Felitti VJ, Anda RF, et al. ^[18]	N= 13494, 2 Subgroups - Respondents - 9508 Nonrespondents- 3986	Questionnaire for 3 types of child abuse Psychological abuse, Physical abuse, Contact sexual abuse. 4 types of household dysfunction Substance abuse, Mental illness,	Questionnaire from 'The Conflict Tactics Scale' used to define psychological and physical abuse during childhood (age <18 years) and to define violence against respondents' mothers.	- 3 to 23.5% of respondents' mothers exerted childhood maltreatment in form of substance abuse, psychological, physical and sexual abuse. - Maltreated child also have same incidence to get exposed to other types of maltreatments. - Childhood exposures have high prevalence for increased smoking, obesity, physical inactivity, depression and suicidal attempts.	A strong dose response relation between breadth of exposure to abuse or household dysfunction during childhood and multiple risk factors for several of leading causes of death in adults have been found. Exposure to one category of childhood abuse or household dysfunction also increase incidence of exposure to another

		Violent treatment of mother or step mother, Criminal behavior.		- More the number of childhood exposures, more are the health risk factors for leading cause of death in adulthood. - Direct strong dose response relationship has been found in number of child abuse exposures and other diseases like ischemic heart disease, cancer, skeletal fractures, poor health.	category of abuse. Adverse childhood experiences are common and they have strong long term associations with adult health risk behaviors, health status and diseases.
Dube SR, Anda RF, Feliti VJ, Chapman DP, Williamson DF, Giles WH. ³²	N = 17337 of 18175. 2 Subgroups - Wave I - 8708, respondents - Wave II - 8629, respondents - Study population included - 9367 (54%) women 7970 (46%) men. Mean age 56years (SD - 15.2)	Retrospective cohort study. ACE study questionnaire, including detailed information about adverse childhood experiences and family and household dysfunction, and Questions about health related behaviors from adolescents to adulthood.	Baseline data collection was divided into 2 survey waves. Wave I - Each participant was mailed questionnaire for childhood abuse and household dysfunction and health related behaviors from adolescents to adulthood. Wave II - added detailed questions about health topics that wave I had	- No substantial difference in prevalence of adverse childhood experiences between wave I and wave II surveys. - 64% of respondents reported at least 1 of the 8 categories of adverse childhood experiences. - Risk factors for suicide - - Self reported alcoholism - 6.5% (men > women) - Illicit drug use - 16.5% (men > women) - Depression - 28.4% (women > men)	- Each of the adverse childhood experience increases risk of ever attempting suicide from 2 to 5 fold. - All these experiences are interrelated to each other and seldom occur in isolation. - Extraordinarily strong and graded association is found between the burden of adverse childhood experience and likelihood of childhood/ adolescent suicidal

			shown to be important.	- Prevalence of attempted suicide decrease with increasing educational level. - Risk of suicide attempt increased 2 – 5 folds by any adverse childhood experience regardless of its category.	attempts as capacity of young people to cope with these stressors are limited.
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Factors affecting consequences of child abuse and neglect (CAN)

English et al.¹² observed that only limited number of children experience unfavorable health consequences after abuse or neglect. However, outcome of individual patient facing such consequences vary widely and are affected by combination of factors that include –

- a) Child’s age and developmental status when abuse or neglect occurred.
- b) Type of abuse or neglect.
- c) Frequency, duration and, severity of abuse.
- d) The Relationship between the victim and the abuser.

It is very difficult to correlate such associations, but it can be extrapolated that under given similar conditions, some children experience long-term consequences of abuse and neglect while others emerge relatively unscathed. Such finding can be associated with the ability of an individual to cope and even thrive, following a negative experience which is referred as “resilience.” Some protective and promotive factors may contribute to an abused or neglected child’s resilience. These include characteristics, such as optimism, self-esteem, intelligence, creativity, humor, and independence, as well as the acceptance of peers and positive individual influences such as teachers, mentors, and

role models. Other factors can include child’s social environment and family’s access to social supports, community well-being including neighborhood stability, access to safe schools and adequate health care.¹³

Child neglect is chronic, neglected children and adolescents are dealing with their needs not being met. Over the time, they begin to feel unworthy of attention and energy; acknowledging parental rejection.¹ Emotional neglect or abuse more closely unifies with later development of psychiatric illness. Effects are directly related to the relationship between the victim and abuser. As the intensity, frequency and duration of abuse increases so does it on the psyche of that child or adolescents.¹⁴

Factors responsible for failure to respond to child abuse and neglect (CAN) -

Health professionals including dental professionals fail to fulfill professional responsibilities against child abuse and neglect because of following reasons:¹⁵

- Lack of knowledge of child abuse and neglect
- Difficulties in diagnosis
- Fear of legal involvement
- Fear of confrontation
- Lack of confidence in social service system

- Isolation from social services or health agencies
- Variations in acceptable definitions
- Indifference to family matters
- Fear of disruption of professional relationships
- Fear of physical/verbal reprisal

Health consequences of child abuse and neglect (CAN)¹⁵

Child abuse and neglect or maltreatment lead to several long-term consequences in children, adolescents as well as adults. It comprises of

- Physical health consequences;
- Psychological;
- Behavioral; and
- Social consequences.

Physical health consequences

The immediate physical effects of abuse or neglect can be relatively minor from bruises or cuts to severe like broken bones, hemorrhage, or even death. In some cases physical effects are temporary; however, the pain and suffering child faces should not be discounted. Meanwhile, the long-term impact of child abuse and neglect on physical health is just beginning to be explored. Below are some outcomes researchers have identified:

Shaken baby syndrome - Shaking a baby of 18 months or younger constitutes shaken baby syndrome. It was first reported by Guthkelch in 1971. It is a form of child abuse where an infant's head is shaken vigorously forward and backward, hitting the chest and shoulders. The injuries caused so may not be immediately noticeable but may include bleeding in the eye or brain, damage to the spinal cord and neck, and rib or bone fractures.¹⁶

Impaired brain development - Child abuse and neglect have been shown, in some cases, to cause regions of the brain fail to grow properly, resulting in impaired development. These alterations in brain maturation have long-term consequences for

cognitive, language, and academic abilities. Neuroimaging studies using technologies such as functional MRI (*Magnetic Resonance Imaging*) and PET (*Positron Emission Tomography*) have identified association of chemical and structural differences in central nervous systems of children and adolescents to measurable size discrepancies in cerebral volume, corpus callosum, amygdala, and hippocampus that may account for some of the cognitive imbalance and inadequacy associated with a history of maltreatment.¹⁷

Poor physical health - Several studies have shown a relationship between various forms of household dysfunction (including childhood abuse) and poor health. Adults, who have experienced abuse or neglect during childhood, are more likely to suffer from physical ailments and dose-response relationship has been observed between duration of exposure to abuse and disease occurrence. Disease conditions including ischemic heart disease, cancer, chronic lung disease, skeletal fractures, and liver disease, as well as self-rated health, has shown a graded relationship to duration of childhood exposures. High levels of exposure to adverse childhood experiences would expectedly produce anxiety, anger, and depression in children.¹⁸

Psychological consequences

The immediate emotional effects of abuse and neglect - isolation, fear, and inability to trust can translate into lifelong consequences, including low self-esteem, depression, and relationship difficulties. Researchers have identified links between child abuse and neglect and the following:

Difficulties during infancy - Depression, and withdrawal symptoms were common among children as young as three who experienced emotional, physical, or environmental neglect. Infants who have been neglected and malnourished may also experience a condition known as 'non-organic failure to thrive.' This refers to a situation in which the child's weight, height, and motor development fall significantly below age-appropriate ranges, without a medical or organic cause. In extreme cases, a death of the child is an end result.¹⁹

Poor mental and emotional health - In one long-term study, as many as 80 percents of young adults who had been abused met the diagnostic criteria for at least one psychiatric disorder at age 21 years. These young adults exhibited many problems, including depression, anxiety, eating disorders, and suicide attempts. Other psychological and emotional conditions associated with abuse and neglect include panic disorder, dissociative disorders, attention-deficit/ hyperactivity disorder, depression, anger, posttraumatic stress disorder, and reactive attachment disorder.²⁰ Particularly sexual abuse in parent and child appear to increase the risk for transmission of suicidal behavior through several possible mechanisms.²¹ Sexual abuse in a parent increases the likelihood of sexual abuse in the child, which in turn increases the likelihood for a mood or anxiety disorder, and for a suicide attempt.²² Second, parents who abuse their children are more likely to attempt suicide as well as have mood and substance disorders, bringing the liability for suicide attempt in children from both genetic and environmental manifestations of a common diathesis.²¹ Third, sexual abuse may increase the likelihood of expression of traits related to suicidal risks, like neuroticism, anxiety, depression, and impulsive aggression.²³ Also, these adverse circumstances could be familiarly transmitted by shared environmental rather than by genetic mechanisms. Abuse and adverse rearing environments result in a decrease in central serotonergic function, a biological system that has been linked to impulsive aggression and suicidal behavior.²⁴

Gene Polymorphisms and Childhood Abuse With Risk of Posttraumatic Stress Disorder Symptoms in Adults -

Child maltreatment significantly increases the risk for impaired physical and psychological health and decreases adaptive functioning in adulthood. Some factors have been established accounting for the relationship of child abuse and Post Traumatic Stress Disorder (PTSD), representing a prolonged symptomatic reaction to child abuse. Child abuse may also increase vulnerability for the later development of PTSD by altering psychological (e.g. attachment) and biological {e.g. *Hypothalamic-*

Pituitary-Adrenal (HPA) axis function} developmental processes; including interactions with genetic factors.²⁴ The reasons for this are not fully understood, but some possible explanations are -

- (1) Compared with other types of traumatic events, child abuse is more likely to occur in the family context²⁵;
- (2) Any type of child abuse is associated with an increased likelihood of exposure to other types or to increased levels of family-related stressful events/parental dysfunction (e.g. parental substance abuse)²⁶; and
- (3) Compared with some other types of trauma exposure, child abuse may be more likely a repeated experience rather than a single event (eg, multiple incidents of sexual abuse by the same perpetrator over a number of years).²⁶

Studies suggest that genetic factors contribute to the development of PTSD, with heritability estimates ranging from 30% to 40%. An interaction between a genetic polymorphism and child abuse in predicting psychopathology was studied by Caspi et al²³ that revealed maltreated children with a *Mono Amine Oxidase A* (MAOA) genotype conferring low levels of MAOA expression were more likely to develop conduct disorder and antisocial-personality disorder and to commit violent crimes as adults compared with those children with the high activity high activity MAOA genotype. Polymorphisms in genes regulating Glucocorticoid Receptors (GR) activity may impact the acute effects of trauma on HPA axis and thereby possibly impact long-term HPA axis regulation affecting the development of PTSD. Some studies suggest that child abuse and neglect affect HPA axis functioning.^{27,28}

Childhood Abuse and Neglect as predictors of Personality Disorder - Researchers have demonstrated associations of childhood maltreatment with Personality Disorder (PD) during adolescence or adulthood. Maltreatments have predictions towards personality disorders and traits. Child abuse a significant environmental risk factor has been conceptualized as psychosocial stressors that contribute to the onset of major depression in vulnerable individuals. An over activity in stress hormone system (HPA axis) of the body, in such

victims, lends credence to the hypothesis of a contribution of stress to the onset of major depression.²⁹

Cognitive difficulties - NSCAW found that children placed in out-of-home care due to abuse or neglect tended to score lower than the general population on measures of cognitive capacity, language development, and academic achievement. A 1999 LONGSCAN study also found a relationship between substantiated child maltreatment and poor academic performance and classroom functioning for school-age children.³⁰

Social difficulties - Children who experience rejection or neglect are more likely to develop antisocial traits as they grow up. Parental neglect is also associated with borderline personality disorders and violent behavior.³⁰

Behavioral consequences

Behavioral problems appear to be more among abused children, even at a young age. Later in life, it may show following effects:

Childhood consequences of child maltreatment - Studies have found that abused and neglected children are at least 25 percent more likely to experience problems such as delinquency, teen pregnancy, low academic achievement, drug use, and mental health problems. Other studies suggest that maltreated children are more likely to engage in sexual risk-taking as they reach adolescence, thereby increasing their chances of contracting a sexually transmitted disease.³¹

Adolescent Consequences of Child Maltreatment - Adolescent maltreatment can be considered if it is continued from childhood or begun after 12 years of age. [Fig.3 shows types of physical abuse amongst adolescents and young adults.] A variety of teenage outcomes, such as delinquency, pregnancy, alcohol and drug abuse, school failure, and emotional and mental health problems, have been identified in such children. As maltreated children grow older, their status as victims may be overlooked as their behavior becomes more disruptive and problematic that includes: Moderate, and violent delinquency; Teen

pregnancy; Drug use; Low academic achievement; Mental health problems.³⁰

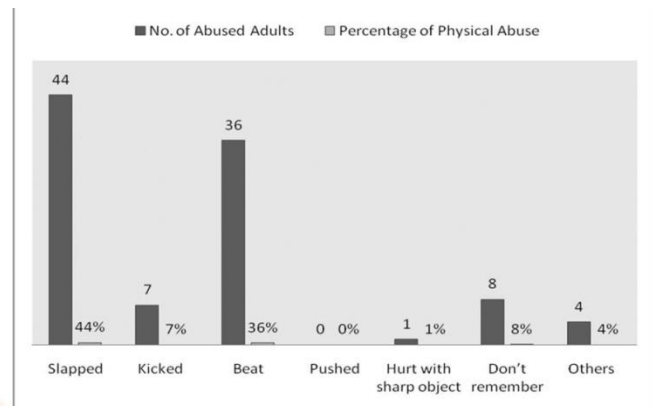


Fig. 3 - Various types of physical abuse amongst young adults

Juvenile delinquency and adult criminality - According to a National Institute of Justice study, abused and neglected children were 11 times more likely to be arrested for criminal behavior as a juvenile, 2.7 times more likely to be arrested for violent and criminal behavior as an adult, and 3.1 times more likely to be arrested for one of many forms of violent crime (juvenile or adult).³²

Alcohol and other drug abuse - Research consistently reflects an increased likelihood that abused and neglected children will smoke cigarettes, abuse alcohol, or take illicit drugs during their lifetime.³²

Abusive behavior - Abusive parents often have experienced abuse during their childhoods. It is estimated approximately one-third of abused and neglected children will eventually victimize their offspring.³⁰

Social consequences

While child abuse and neglect almost always occur within the family, the impact does not end there. Society as a whole pays the price for child abuse and neglect, regarding both direct and indirect costs.

Direct costs - Direct costs include those associated with maintaining a child welfare system to investigate and respond to allegations of child abuse and neglect, as well as expenditures by the judicial,

law enforcement, health, and mental health systems.³⁰

Indirect costs - Indirect costs represent the long-term economic consequences of child abuse and neglect. These include costs associated with juvenile and adult criminal activity, mental illness, substance abuse, and domestic violence. They can also comprise loss of productivity due to unemployment and underemployment, cost of special education services, and increased use of health care system.³⁰

Discussion

The endocrine system works closely with the nervous system to regulate body's physiology. The *Hypothalamic-Pituitary-Adrenal* (HPA) axis and sympathoadrenal system serve as peripheral limbs via which brain influences virtually every cell in the body during exposure to threatening stimuli. [Fig. 4 shows schematic presentation of the role of Hypothalamic-Pituitary-Adrenal (HPA) axis in stress.]

The brain also differentially activates a subset of vagal & sacral parasympathetic efferents mediating gut responses to stress.³³ On the other hand; acute stress is thought to induce pro-inflammatory activities in tissues through neural activation of the peripheral *Corticotropin-Releasing Hormone* (CRH) - mast cell histamine axis. The hypothalamus controls the secretion of *Pro-Opio-Melano-Cortin* (POMC) products that include corticotrophin (ACTH) and P-endorphin from the anterior pituitary corticotrophs. ACTH stimulates secretions of glucocorticoid hormones, mainly cortisol by the adrenal cortex in humans.

HPA Axis Response

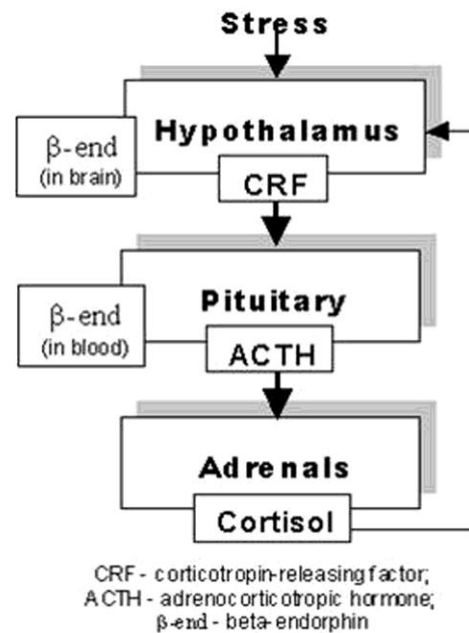


Fig. 4 - Roll of Hypothalamic-Pituitary-Adrenal (HPA) axis in stress response

Moreover, other POMC product, P-endorphin, may stimulate adrenal medulla to secrete epinephrine as well. The locus coeruleus-norepinephrine system controls stress induced stimulation of sympathoadrenal system. The Barrington nucleus, nucleus tractus solitarius, and dorsal motor vagal nucleus are thought to control differential activation of vagal and sacral parasympathetic efferents that mediate gut responses to stress. The amygdala, acting in concert with the hippocampus, anterior cingulate and prefrontal cortices, mediates focused attention on a perceived threat, affective inflexibility, and fear-related behavior.³⁴

Traumatic experiences cause traumatic stress, which disrupts homeostasis and causes both immediate and long-term endocrine changes that affect metabolism and neurophysiology. During stress, HPA system is also activated, leading to increased levels of cortisol, a glucocorticoid released by the adrenal cortex that modulates physiologic response to stress and helps effective coping strategies. Child abuse or maltreatment induces acute stress in children as well as adolescents. The presentation of Rochester study data has examined consequences of childhood maltreatment regarding subsequent adolescent

problem behaviors. The significance of child neglect should come as no surprise, given that a lack of parental care and nurturance - hallmarks of child neglect - poses one of the threats to children's healthy growth and well-being.³⁵ When children are exposed to stressful events such as recurrent abuse or witnessing domestic violence can disrupt early development of the central nervous system, which may adversely affect brain functioning later in life.³⁶

Conclusion

Child abuse is a result of a process with origins of years, or sometimes even generations before the event. The process is different for every individual. Effects vary depending on circumstances of the abuse or neglect, personal characteristics of the child, and child's environment. Consequences may be mild or severe; disappear after a short period or last a lifetime; and affect the child physically, psychologically, behaviorally, or combination of all three ways. Adverse childhood experiences have strong long-term associations with adult health risk behaviors, health status, and diseases. Such consequences demand increased attention towards primary, secondary, and tertiary prevention strategies.

Clinical relevance

Childhood abuse imprints changes in DNA expression; affecting genes regulating the stress responses that influence the Hypothalamic-Pituitary-Adrenal (HPA) function. It affects epigenetic regulation of glucocorticoid receptor in the human brain that plays a role to deal with stress. Child abuse also increases the risk of suicide in victims during adulthood because of different epigenetic markings in a part of the brain. Thus the strategies for prevention of such occurrences should include an elimination of adverse childhood experiences from families as well as society, preventing the adoption of health risk behaviors as responses to adverse experiences during childhood and adolescence.

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