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Determinants of Febrile Seizures with special reference to Serum Electrolytes, Glucose, Calcium and Zinc: A Case Control Study

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Abstract

Background: Febrile seizure is an important cause of hospitalisation and morbidity among toddlers and young infants. Various studies have been undertaken in the past to find the association between febrile seizures and several biochemical parameters such as serum Sodium, serum Albumin etc.

Objectives: To study the association between levels of serum sodium, calcium, potassium, glucose, zinc and febrile seizures.

Methods: This hospital based case control study included patients aged 6 months to 5 years admitted with fever and seizures at a tertiary care teaching hospital over a period of 6 months. Baseline demographic parameters were collected and serum Sodium, Potassium, Calcium, Zinc and random blood sugar estimation was done.

Results: A total of 100 cases and 100 controls were included (boys:girls = 2:1). Mean age of cases was 22.39 months while that of controls was 23.29 months. Mean Serum Sodium, Serum Potassium and Serum Zinc levels were found to be lower among cases which was statistically significant. No significant difference could be found between the two groups with respect to mean Random blood sugar and mean serum Calcium.

Conclusions: Serum Sodium, serum Potassium and serum Zinc levels are significantly lower among children with febrile seizures in comparison to children with fever without convulsion, indicating that deficiency of Sodium, Potassium and Zinc play significant role in the pathogenesis of febrile seizures. There is significant lack of awareness regarding febrile seizure and intermittent prophylaxis of febrile convulsion among the parents. Serum sodium level and serum calcium level are predictors of recurrence of febrile seizure.

Keywords: Febrile Seizure; Serum Calcium; Serum Potassium; Serum Sodium; Serum Zinc.

Introduction

Febrile seizures are the seizures that occur between the ages of 6 and 60 months (peak12-18 months) with a temperature of 38C (100.4F) or higher, that are not the result of Central Nervous System (CNS) infection or any metabolic imbalance, and that occur in the absence of a history of prior afebrile seizures.[1] Between 2-5% of neurologically healthy infants and children experience at least one, usually simple febrile seizure. Although approximately 15% of children with epilepsy have had febrile seizures, only 5% (range 1-33%) of children who experience febrile seizures proceed to develop epilepsy later in life.[2,3] A positive family history for febrile seizures can be elicited in 25-40% of children with febrile seizures, and the reported frequency in their siblings ranges from 9-22%.[4]

Among the serum electrolytes, sodium is an important factor in neuronal cell depolarization and production of electrical discharge and

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finally seizures.[5] Even in animals, reduced serum sodium levels have been shown to lower the threshold to convulsive stimuli. No study to date has demonstrated a benefit of anti-pyretic use in decreasing the incidence of recurrence of febrile seizures. This suggests that fever is not the only factor involved in the etiology of febrile convulsion. However, American Academy of pediatrics (AAP) does not recommend blood evaluations such as serum electrolytes, calcium, zinc and blood glucose unless clinically indicated.[6]

Considering the contradictory reports and the importance of pediatric febrile seizures, this study was conducted to investigate the role of serum sodium in febrile seizures. If relative hyponatremia is predictive of seizure recurrence in febrile seizures, sodium replacement and fluid restriction might be indicated in selected patients. However, serum potassium levels in different studies showed no statistically significant differences.[7,8] Studies have shown different (often inconclusive) results for an association between reduced serum calcium and febrile seizure. Excitatory post synaptic transmissions that occur with very low calcium levels lead to uncontrolled epileptiform discharges on electroencephalogram. In the brain, hundreds of intracellular processes are known to depend on serum calcium.[9] Hence this study was conducted with an objective to study the association between serum electrolytes and febrile seizures.

A number of trace elements are said to play a role in febrile convulsions by their coenzyme activity or ability to influence ion channels and receptors. Zinc acts as a co-factor of glutamic acid decarboxylase, an enzyme which maintains the production of gamma amino butyric acid (GABA) in central nervous system and decrease level of Zinc in Cerebro Spinal Fluid (CSF) has also been observed in febrile seizures. In CNS, Zinc acts as a neuro-secretory product. Zinc is highly concentrated in the synaptic vesicles of a specific contingent of neurons called "zinc containing neurons". Recent evidences indicate that deficiency of zinc can play significant role in febrile seizures.[10] Therefore with regard to importance of febrile seizure and its possible contributing factors including serum zinc level, this study was conducted to compare the serum Zinc levels in children with febrile seizures in comparison with febrile children without seizures.

Objectives

This present study has been undertaken with the following objectives:

- To study the association between levels of serum sodium, calcium, potassium, glucose, zinc and febrile seizures.

Material and Methods

This is a hospital based case control study carried out among patients of febrile seizures and age-sex matched controls attending the Department of Pediatrics of a tertiary care teaching Hospital of Central Odisha. It was carried out from March 2019 to October 2019. Sample size was calculated basing on the hospital based prevalence of febrile seizures every month. Data was collected on every alternate day from patients admitted to the wards of Department of Pediatrics with febrile seizures. Nearly 10-12 cases/controls could be investigated each week and a face-to-face interview was conducted using pre-tested, pre-designed semi-structured questionnaire. So, in a five months' time of data collection we could obtain a total of 104 cases and 101 controls and the final analysis was done using 100 cases and 100 controls. Children aged between 6 months and 60 months of either sex presenting with fever with seizure to OPD and Casualty of Department of Pediatrics were regarded as cases and children with fever of any etiology without seizures were regarded as controls. Cases with the following conditions were excluded from the study such as:

- Gastrointestinal diseases leading to electrolyte imbalance
- CNS infections like meningitis and encephalitis
- Neurological or structural abnormalities in the brain or skull
- Protein Energy Malnutrition
- Children on Zinc Supplements

Informed consent of parents of both groups of children was obtained in the vernacular language. Institutional ethical committee certificate was obtained prior to the study.

Prior to inclusion of the children in the study, a detailed history of presenting complaints was recorded including duration of fever, time of onset of seizures, type of seizures, duration of seizures, past history of febrile convulsion, family history of febrile convulsion, awareness about febrile convulsion and about intermittent prophylaxis. In addition to this, history suggestive of any triggering factors for febrile episode like cough, cold, nasal discharge, ear discharge, burning micturition or

crying during micturition were also recorded.

Vital signs such as heart rate, respiratory rate, oxygen saturation, blood pressure were measured and recorded. The axillary temperature was recorded in all children with digital thermometer placed in axilla for three minutes.

Four milliliters of whole blood was collected by venipuncture under strict aseptic precautions and sent to biochemistry laboratory of our hospital for assessment of serum electrolytes (sodium, potassium and calcium) and serum zinc.

Random blood sugar (RBS) was measured by glucometer by capillary method taking blood from tip of middle and 4th finger. Hypoglycemia was considered if RBS <54mg/dL.

Socio-economic status of the family of both cases and controls was determined by Modified Kuppuswamy scale updated for 2017.[11]

Statistical Analysis

Data were entered using Microsoft excel 2010 and analyzed using statistical package for Social Sciences version 21. Descriptive statistics were used and results were expressed as mean (standard deviation) or frequencies and percentages. Categorical variables were compared using Pearson's chi-square test. Comparison of means was done using independent T-test and P-value <0.05 was taken as significant.

Results

The mean age of cases was 22.39 (± 13.94) months and the mean age of controls was 23.29 (± 23.29 months). The male:female ratio was similar in both groups i.e. 2.125:1 (cases) and 2.03:1 (controls). The mean duration of fever in the study among the cases was 1.99 (± 1.068) days and among the controls was 2.16 (± 1.080) days. 64% of them presented with first episode of febrile seizure whereas 36% of the children had previous episodes of febrile seizure. Only 8% of them had family history of seizure. 64% of parents were previously unaware regarding the febrile seizure and its prevention. Among children with previous history of febrile seizure, 95% of them were not taking intermittent prophylaxis for febrile seizures.

Table 1 shows the differences between cases and controls with respect to various investigations carried out in them. Mean Serum Sodium, Serum Potassium and Serum Zinc was found to be lower among cases which was statistically significant. No significant difference could be found between the two groups with respect to mean Random blood sugar and mean serum Calcium.

Table 1: Comparison of Various Parameters of Investigations Among Cases and Controls (n=200).

Investigations	Cases (Mean ± SD)	Controls (Mean ± SD)	P Value (Independent T Test)
Random Blood Sugar	108.83 ± 19.31	111.45 ± 16.64	0.30
Serum Sodium	137.29 ± 5.02	140.02 ± 3.79	<0.001
Serum Potassium	4.78 ± 0.10	4.94 ± 0.21	<0.001
Serum Calcium	1.03 ± 0.10	1.02 ± 0.10	0.25
Serum Zinc	57.13 ± 20.46	77.25 ± 18.74	<0.001

Table 2 shows the association of different socio-demographic variables. 83% of cases belonged to low SES which was significantly different than the controls among which only 71% belonged to low SES (p=0.04, OR 1.99, 95% CI 1.01-3.92). Parent who were just literate i.e. 46% were found to have significantly higher proportion of children with febrile seizures than compared to those who were more educated (P=<0.001, OR 1.92 95% CI 1.92-6.85). It was also seen that parents who were unaware regarding the disease, its management and prevention were less educated compared to those who were more educated. Only 13.6% of parents who were aware regarding the disease and its prevention strategies gave the intermittent prophylaxis for prevention of seizures.

Table 2: Association Between Clinical and Social Factors Among Cases and Controls (n=200)

	Low Ses	Other Ses	P -Value	OR (CI)
Cases	83 (83)	17 (17)	0.04	1.99 (1.01-3.92)
Controls	71 (71)	29 (29)		
	Just Literate	**Others**	**P-Value**	**Or (CI)**
Cases	46 (46)	54 (54)	<0.001	3.63(1.92-6.85)
Controls	19 (19)	81 (81)		

Awareness absent	24 (37.5)	40 (62.5%)	0.02	0.38 (0.16-0.88)
Awareness present	22 (61.1%)	14 (38.9%)	_	_
Not taking Prophylaxis	43 (45.3%)	52 (54.7%)	0.51	0.55 (0.08-3.45)
Taking Prophylaxis	3 (60%)	2 (40%)		
Characteristics	**Not Taking Prophylaxis N(%)**	**Taking Prophylaxis N(%)**	**P-Value**	**OR(CI)**
Awareness absent	64(100)	0(0)	0.002	1.16 (1.01-1.32)
Awareness Present	31(86.1)	5(13.9)		
Male	66 (97.1)	2(2.9)	0.16	3.4 (0.54-21.5)
Female	29(90.6)	3(9.4)		

Table 3: Comparison of Parameters of Various Investigations Done with History of Previous Convulsion Among Cases (n=100).

Investigations	Recurrent of Episode Febrile Seizure	First Episode of Febrile Seizure	P-value (Independent T-test)
Serum Sodium	135.21 4.92	138.47 4.72	0.02
Serum Potassium	4.71. 0.52	4.810.41	0.29
Serum Calcium	0.97 0.09	1.07 0.09	< 0.001
Serum Zinc	56.73 19.22	57.36 21.28	0.88

We found mean serum sodium among the cases who presented with first episode of febrile convulsion was 138.47 (4.72) mEq/L which was significantly higher (p=0.02) than those who had recurrent episodes of febrile seizures. Similarly, serum calcium was significantly higher in those cases who presented with first episode of febrile seizure than those who had repeated episodes. The difference in serum values of Potassium and Zinc between patients with first episode and recurrent episodes of febrile seizures was not found to be statistically significant.

Discussion

The mean age of cases was 22.39 months and that of controls was 23.29 months which was similar to the findings in other studies.[12] We found only 8% with family history of febrile seizures contrary to the findings of other studies where 57% of cases had a positive family history of febrile seizures. Only 3 out of 10 parents were aware of febrile seizure, its management and prevention. Lack of awareness regarding febrile seizures among parents led to providing intermittent prophylaxis in only 5% cases.

The mean of serum sodium among cases was found to be 137.29 with a significant difference when compared to controls which was similar to other studies.[12,13] On the contrary, some other dtudies did not find any significant difference in the levels of Serum sodium between cases and controls.[14,15] Our study found a significant difference in levels of potassium between cases and controls similar to other studies. We did not find a significant difference in serum levels of potassium among cases and controls similar to some other studies.[16,17] Different studies carried out in different parts of the world have showed a similar result of serum zinc being significantly different between cases and controls.[18-24]

We found a relative hyponatremia in cases of recurrent febrile seizures when compared to those who had first episode of febrile seizures similar to other studies.[14,25] Serum calcium was found to be significantly low among cases with previous episode of febrile seizure which has also been seen with other studies.[17]

The limitations of the present study are

- A larger sample size and involvement of multiple centres could have increased the external validity of the study.

Conclusions

This study shows that, among children with febrile seizures, serum Sodium, serum Potassium and serum Zinc levels are significantly lower in comparison to children with fever and without convulsion, indicating that deficiency of Sodium, Potassium and Zinc play significant role in the pathogenesis of febrile seizures. The role of zinc in febrile convulsions should be investigated by further studies and if the results are reproducible, zinc supplementation can be given for prophylaxis of febrile seizures. This study also shows that there is significant lack of awareness regarding febrile seizure and intermittent prophylaxis of febrile convulsion among the parents. It is also concluded from this study that, serum sodium level and serum calcium level are predictors of recurrence of febrile seizure.

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Innate Covid 19 Infection Masquerading as Hydrops Fetalis: Revealing The Hidden Iceberg

Praveen Unki[1], Madhunandan Krishnegowda[2], Shreyas Vishwanath[3], Hemanth Kumar N[4]

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Abstract

Introduction: Portentous pandemic of COVID-19 chaos has caused incredulous insult on human race. COVID-19 infection in pregnant women is as same as other reproductive age group. Data is limited on perinatal COVID-19 transmission; in this study we report a case of innate COVID-19 infection in a neonate with post covid sequel.

Methodology: Prospective observational study conducted in a tertiary care centre.

Results: A 21 year old pregnant women at her 32 weeks of gestation was tested positive for COVID-19 (RTPCR), she had asymptomatic course, delivered a baby with features of Hydrops fetalis. Baby showed elevated levels of anti SARS CoV antibodies. We hypothesise causality of Hydrops fetalis could be innate COVID-19 infection.

Discussion: Hydrops fetalis has classically been defined as the presence of extracellular fluid in at least two fetal body compartments. Across the globe there are two reported cases of Hydrops fetalis. In first case there was fetal demise at 13 weeks of gestation with changes of Hydrops fetalis, viral particle in placenta and amniotic fluid was demonstrated. In second case a preterm baby was delivered at 35 weeks of gestation with changes of Hydrops fetalis, where mother had recovered from COVID-19 infection during pregnancy.

Keywords: Hydrops fetalis; Covid-19; Infection.

Introduction

Portentous pandemic of COVID-19 chaos has caused incredulous insult on human race. Ranging from plethora of no symptoms to fully blown ARDS, from simple home isolation to prolonged ICU stay, from no medication to lung transplantation, from speedy recovery to sad demise. It infects all age groups both children and adults, ab initio it was found that elderly and individuals with comorbidities have higher fatalities.[1] Of late, some studies have reported turbulent course of COVID-19 in children.[2-4] There is a constant evolution of knowledge regarding the progression of COVID-19. COVID-19 infection in pregnant women is as same as other reproductive age group.[5] Data is limited on perinatal COVID-19 transmission; in this study we report a case of innate COVID-19 infection in a neonate with post covid sequel.

Materials and Methods

This was a prospective observational study conducted in Neonatal Intensive Care Unit of Tertiary care hospital. Baby was enrolled in the study and worked up for possible cause of Hydrops fetalis. Patient was monitored for 10 days and discharged thereafter with follow-up advice.

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Result

A 21 year old pregnant women at her 32 weeks of gestation was tested positive for COVID-19 (RTPCR), she had asymptomatic course. At 37 weeks of gestation she delivered a female child of birth weight 1970gram through lower segment caesarean section (LSCS), indication for LSCS was non reassuring fetal heart rate and in utero passage of meconium. Baby was separated from mother and admitted in neonatal intensive care unit in view of respiratory distress. Baby required nasal CPAP for the initial 4 hours then was subsequently tapered to room air. Physical examination revealed generalised edema from head to toe including the genitals, frank ascites was demonstrated and there was microcephaly and tongue tie.

There was notable chest wall edema and pericardial effusion in chest radiograph (Fig. 1).

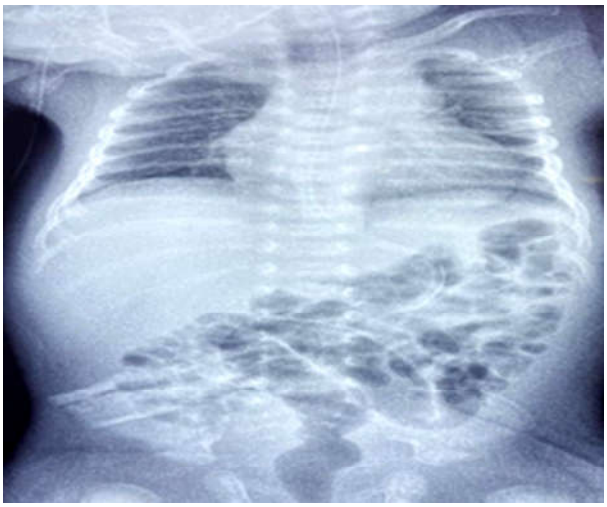

Fig. 1: Chest X-Ray(AP view) showing pericardial effusion and chest wall edema.

2D echocardiography showed pericardial effusion. Abdominal ultrasonography revealed ascites. Neurosonography was normal. Baby had leucopenia and thrombocytopenia. Liver function test showed elevated SGOT 335 U/L and SGPT 297 U/L and renal function test was normal. Blood and urine cultures were negative for bacterial growth. Baby was tested for TORCH infections which was negative. Fundoscopy showed bilateral retinal haemorrhage (Fig. 2). There was no blood group incompatibility. Considering COVID-19 positivity in mother at her 32nd weeks of gestation, baby was subjected for testing of anti SARS CoV-2 antibodies to spike protein; we found elevated levels of antibodies (20.45 U/ml), suggesting intrauterine COVID-19 infection. When placenta was subjected to histo-pathological examination it showed fibrinoid necrosis. We hypothesise causality of Hydrops fetalis could be innate COVID-19 infection.

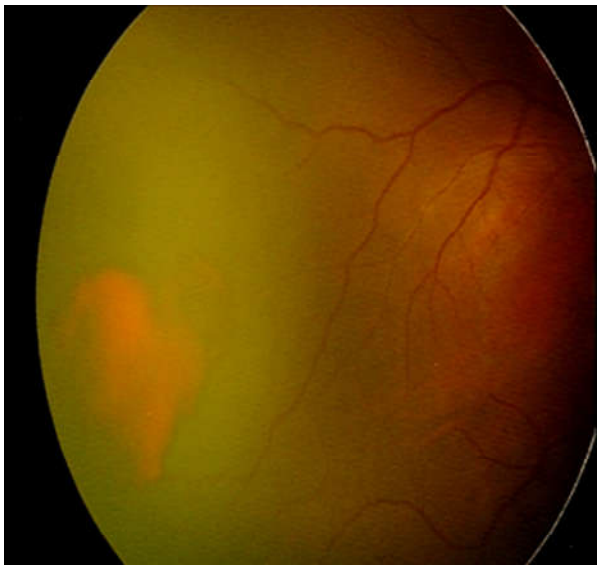

Fig. 2: Fundoscopy showing retinal hemorrhage.

Discussion

Hydropsfetalis has classically been defined as the presence of extracellular fluid in at least two fetal body compartments.[6] Causes of Hydrops fetalis can be immune and non-immune, non-immune causes constitutes significant number in modern day medicine.[6]

Few authors have reported the rare possibility (1-3%) of vertical transmission of COVID-19.[7,8] Mechanism of vertical transmission is favoured by detection of SARS-CoV-2 in placenta by immunohistochemistry or other molecular methods.[7,9] Human placenta has shown to express ACE2 receptor which could be the portal of entry for COVID-19 virus.[10] Another possible explanation for intrauterine SARS-CoV-2 infection is via maternal immune cells or, less commonly, during vaginal delivery.[11]

Across the globe there are two reported cases of Hydrops fetalis. First case was reported by Shinde et al[12], where the pregnant woman was tested positive for COVID-19 at 8 weeks of amenorrhoea and had asymptomatic course for the same. When she underwent routine ultrasonography 5 weeks later then it showed fetal demise with changes of Hydrops fetalis. They demonstrated viral particle in placenta and amniotic fluid.

Second case was reported by Krasniqi F et al[13], where a pregnant lady with 35 weeks of gestation delivered a baby with Hydrops fetalis. They ruled

out common causes of Hydrops fetalis but all the results were negative. They also found that mother had recovered from COVID-19 and concluded that possible cause of Hydrops fetalis is COVID-19. Antibodies in baby or viral particles in placenta were not demonstrated. Baby was discharged from the hospital in stable condition.

To the best of our knowledge, our case is the third case reporting association of Hydrops fetalis and COVID-19, wherein we found the baby to have features of Hydrops fetalis along with that baby had microcephaly, retinal hemorrhage and tongue tie. Placenta was found to have fibrinoid necrosis. Anti SARS CoV-2 antibodies to spike protein was elevated levels of antibodies 20.45 U/ml.

Conclusion

Studies have shown the evidence of in utero COVID-19 infection but causal association of COVID-19 disease and Hydrops fetalis has not been established. Though two other cases have reported COVID-19 infection and Hydrops fetalis, it needs to be confirmed by further studies. We hypothesise from the observation made by our team that causality of Hydrops fetalis could be innate COVID-19 infection.

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Case Report

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Adjustment Reaction in School Children

Tufail Bashir[1], Vaibhav Chauhan[2], Hema Kumari[3], S P Subashini[4]

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Abstract

Adjustment is a built-in way to deal with a problem or other life facts. Adjustments were taken as an indication of integration; harmonious human behavior when another person in society sees the person being properly corrected. Adjustment begins from childhood. Adjustment is not as simple as adapting to a new environment or environment. It is actually a process of behavior in which humans and other animals maintain a balance between their various needs or between their needs and the barriers of their environment. Common problems in coping with stress, alcohol abuse, suicide (Tried and Ended), drug abuse, bipolar affective disorder, violence, murder, rape, robbery, serious assault, child abuse, sexual abuse, phobia (Social phobia), behavioral disorders and mental illness.

Keywords: Harmonious behavior; Bipolar affective disorder; Homicide; Schizophrenia.

Introduction

Adjustment is a process of behavior in which different people and creatures maintain a balance between their different needs or between their needs and the environmental barriers. The sequence of consents begins when the need is felt and ends when it is fulfilled. Coping is a process of controlling tax situations, using an effort to solve personal and personal problems, and seeking to know, reduce, reduce or tolerate pressure or conflict.

Adjustment is an ongoing process, not a permanent or permanent condition, in fact correction is defined as an ongoing process of satisfying one's desires, and it involves many aspects of behavior. The amendment covers four specific areas which are academic reform, social reform, personal emotional remediation, and adherence to educational and institutional goals and objectives.

Children with mental illness face significant challenges of discrimination, segregation and discrimination, and lack of access to health care and educational institutions, which violate their basic rights. The wealth of the country is small in terms of modesty and unique property but lies largely in the nature and environment of the majority of its children and youth. They will be the makers and creators of the future of this country. Today's children will be adults tomorrow. Their level and ownership will determine the type of predestination that will enhance the country. Helping a child is important when he or she is in trouble and school life can affect the children's development. This study can conclude that as adjustment grows the coping behavior increases at a slower rate.

The transition to adulthood will largely depend on whether a person becomes an adult. Adolescence is often believed to be a time of great stress and

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turmoil as rapid physical and mental changes take place during this time. All cultural groups are expected of each individual according to their stage of development. The successful completion of such developmental activities leads to happiness and helps to succeed in the latest endeavors, the failure of unhappiness and development. Young people are going through a transition into adolescence and one of the biggest challenges they will face is affecting mental health and social identity. They deal with all kinds of pressures, difficulties and situations such as peer pressure, moving to a new school, breaking up with friends, conflicts with parents, striving for independence, tests, feeling unwell, changing or home turmoil, exam stress and failure and above all adolescence changes, expulsion from school or absenteeism.

Life is a continuous improvement of internal relationships and external relationships. Every new fix is a disaster for self-esteem. All biological events work to correct, there are no biological actions without correction. Adjusting another calibration name. Equilibrium is universal, or what you do not have outside of dispersal.

Although most corrective disorders are resolved within six months of the event, some children and adolescents may have long-term consequences of the disorder. These long-term effects may include: Insomnia, Social isolation and withdrawal, Drug Abuse, Alcohol, Schizophrenia, Depression, Mental Disorders, Behavior Change, Behavior Change, Emotional Modification, Bipolar Disorder, Antisocial Personality Disorder, Self-Destruction, Thoughts suicide and behavior. Adolescence is an important period in which you face many problems of recognition with your parents, peer groups and all other members of the community. It is therefore the responsibility of parents to understand the problems of correcting their children.

Conclusion

Corrective disorders are more common among children and adolescents, occurring at regular intervals between boys and girls. Disruption disruptions occur in all cultures; but cultural influences may influence the type of stress and symptoms experienced. Children and adolescents of all ages experience correctional disorders; however, it is thought that the symptoms of the disease will vary between children and adults. Adults may experience more emotional reactions while children and teens tend to imitate.

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The second page should carry the full title of the manuscript and an abstract (of no more than 150 words for case reports, brief reports and 250 words for original articles). The abstract should be structured and state the Context (Background), Aims, Settings and Design, Methods and Materials, Statistical Analyzis used, Results and Conclusions. Below the abstract should provide 3 to 10 keywords.

Introduction

State the background of the study and purpose of the study and summarize the rationale for the study or observation.

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Include summary of key findings (primary outcome measures, secondary outcome measures, results as they relate to a prior hypothesis); Strengths and limitations of the study (study question, study design, data collection, Analyzis and interpretation); Interpretation and implications in the context of the totality of evidence (is there a systematic review to refer to, if not, could one be reasonably done here and now?, What this study adds to the available evidence, effects on patient care and health policy, possible mechanisms)? Controversies raised by this study; and Future research directions (for this particular research collaboration, underlying mechanisms, clinical research). Do not repeat in detail data or other material given in the Introduction or the Results section.

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List references in alphabetical order. Each listed reference should be cited in text (not in alphabetic order), and each text citation should be listed in the References section. Identify references in text, tables, and legends by Arabic numerals in square bracket (e.g. [10]). Please refer to ICMJE Guidelines (http://www.nlm.nih.gov/bsd/uniform_ requirements.html) for more examples.

Standard journal article

[1] Flink H, Tegelberg Å, Thörn M, Lagerlöf F. Effect of oral iron supplementation on unstimulated salivary flow rate: A randomized, double-blind, placebo-controlled trial. J Oral Pathol Med 2006; 35: 540–7.

[2] Twetman S, Axelsson S, Dahlgren H, Holm AK, Källestål C, Lagerlöf F, et al. Caries-preventive effect of fluoride toothpaste: A systematic review. Acta Odontol Scand 2003; 61: 347–55.

Article in supplement or special issue

[3] Fleischer W, Reimer K. Povidone-iodine antisepsis. State of the art. Dermatology 1997; 195 Suppl 2: 3–9.

Corporate (collective) author

[4] American Academy of Periodontology. Sonic and ultrasonic scalers in periodontics. J Periodontol 2000; 71: 1792–801.

Unpublished article

[5] Garoushi S, Lassila LV, Tezvergil A, Vallittu PK. Static and fatigue compression test for particulate filler composite resin with fiber-reinforced composite substructure. Dent Mater 2006.

Personal author(s)

[6] Hosmer D, Lemeshow S. Applied logistic regression, 2nd edn. New York: Wiley-Interscience; 2000.

Chapter in book

[7] Nauntofte B, Tenovuo J, Lagerlöf F. Secretion and composition of saliva. In: Fejerskov O,

Kidd EAM, editors. Dental caries: The disease and its clinical management. Oxford: Blackwell Munksgaard; 2003. pp 7–27.

No author given

[8] World Health Organization. Oral health surveys - basic methods, 4th edn. Geneva: World Health Organization; 1997.

Reference from electronic media

[9] National Statistics Online—Trends in suicide by method in England and Wales, 1979–2001. www.statistics.gov.uk/downloads/theme_health/HSQ20.pdf (accessed Jan 24, 2005): 7–18. Only verified references against the original documents should be cited. Authors are responsible for the accuracy and completeness of their references and for correct text citation. The number of reference should be kept limited to 20 in case of major communications and 10 for short communications.

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