October 2023 | Volume 1 | Issue 4 | RNI No.: MPENG/2022/83989 | Quarterly

ISSN : 2583-9454 (PRINT)

IJDBP

Indian Journal of Developmental & Behavioral Pediatrics

The Official Journal of IAP Chapter of Neurodevelopmental Pediatrics

AADARSH®

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PUBLISHED BY

IAP Chapter of Neurodevelopmental Pediatrics
7th Floor, IMA House, Jawaharlal Nehru International Stadium Road, Palarivattom, Cochin, Keral-682025
Email : cdgiap@gmail.com, **Website** : www.iapndp.org

PRINTED BY

Aadarsh Pvt. Ltd.
Shikhar Varta, 4, Press Complex, Zone-I, M.P. Nagar, Bhopal-462 011 (M.P.) INDIA
Tel. : +91-755-2555442, **Email** : info@aadarsh.com, **Website** : www.Aadarsh.com

Aims and Scope of Indian Journal of Developmental and Behavioural Pediatrics (IJDBP)

IJDBP is a specialty journal in Developmental and Behavioural pediatrics published by Indian Academy of Pediatrics Chapter of Neurodevelopmental Paediatrics

The Journal welcomes Original papers, Review articles, Case reports and other articles relevant to child development & Behaviour including :

- Neuro developmental disorders,
- Developmental delays,
- Behavioural issues,
- Autism,
- Attention deficit hyperactivity disorder,
- Learning difficulties,
- Intellectual disabilities,
- Evidence based role of early intervention,
- Family centred multidisciplinary intervention,
- Neurogenetic disorders affecting child development,
- Neuroimaging & Neurological issues affecting child development,
- Corrective and assistive surgeries
- Home environmental and environmental issues affecting child development,
- Medical conditions
- Low birth weight and High-risk neonate requiring neonatal intensive care & its outcome,
- Preventive aspects in adolescents and pregnancy.
- Management of conditions covered in Rights of Persons with Disability Act,2016 of GOI.

It aim to promote advances in research in the field of child development and Behavioural issues so that latest evidenced based information is shared to enhance the quality of care and improve lives of children with special needs and their families.

The journal will be National Double Blind Peer review Open access journal published Quarterly. We will accept for publication manuscripts that were not published earlier in any form. The journal is devoted to publishing quality papers based on original innovative and most advance research in the field of developmental behavioural pediatrics.

The Journal aims to have the highest possible ethical and publication standards by scrutinizing the papers, through peer review assisted by eminent experts from prestigious teaching institutes from the country. For all Manuscripts submitted the journal will employ a plagiarism detection system for detecting plagiarism against previously published work.

INVITED GUEST EDITOR

In my capacity as the **President-Elect of IAP 2023** and as a dedicated member of the medical community, I am pleased to express my profound appreciation for the pivotal role that the Indian Academy of Pediatrics plays in advancing child health in our nation. While commendable strides have been made in pediatric care, I am compelled to urgently draw attention to the imperative need to emphasize and prioritize Developmental Behavioral Pediatrics in India.

Over the recent years, our comprehension of child development has seen exponential growth, accompanied by an enhanced recognition of the vital role played by developmental behavioral pediatricians. The formative years of a child's life lay the groundwork for their future health, well-being, and success. Despite historical challenges such as infectious diseases and malnutrition in India, it is crucial not to overlook the escalating burden of developmental and behavioral disorders among our children.

Despite advancements in medical science, a considerable number of children in India grapple with developmental challenges that often go unnoticed or unaddressed. Ranging from autism spectrum disorders to attention-deficit/hyperactivity disorder (ADHD) and other developmental delays, the spectrum of conditions is vast and varied. These challenges not only impact immediate development but also pose long-term consequences for education, employment, and overall quality of life.

I implore the IAP Chapter of Neurodevelopmental Pediatrics and professionals in Developmental Behavioral Pediatrics to lead a concerted effort in advocating for the integration of Developmental Behavioral Pediatrics into the mainstream healthcare system. This should encompass:

Enhanced Training and Education:

Integrate comprehensive training modules on developmental and behavioral pediatrics into the curriculum for medical professionals. This will empower healthcare providers nationwide to identify, diagnose, and manage developmental disorders early on. Notably, during my previous tenure as Honorary Secretary General, IAP, 2020-21, IAP launched an ambitious program of Nurturing Care for Early Childhood Development, successfully training over 6000 pediatricians across India.

Collaboration with Stakeholders:

Forge partnerships with governmental bodies, non-profit organizations, and other stakeholders within and outside IAP to create a comprehensive support system for children with developmental and behavioral challenges. Collaboration will amplify the impact of our efforts and ensure a holistic approach to child health.

Research and Data Collection:

Foster research initiatives to better understand the prevalence, risk factors, and patterns of developmental and behavioral disorders in the Indian population. This data will be instrumental in tailoring interventions to the specific needs of our diverse communities.

Public Awareness Campaigns:

Launch nationwide awareness campaigns to educate parents, caregivers, and educators about the importance of early detection and intervention in developmental and behavioral issues. Timely identification can lead to more effective interventions and improved outcomes. As President IAP 2024, I am finalizing a strategy to launch a pervasive outreach program of community service and communication - IAP ki Baat, Community ke Saath. This will provide authentic and useful information to the public at the click of a button via IAP Media Platforms.

Policy Advocacy:

Advocate for policies that prioritize developmental and behavioral pediatrics in the national healthcare agenda. This includes allocating resources, establishing specialized clinics, and integrating developmental screening into routine pediatric care.

My heartfelt congratulations and appreciation go to the editorial board, led by Dr. Zafar Mahmood Meenai, guided by Chief Patron Dr. MKC Nair and Patron Dr. Shabina Ahmed, Co-Editors Prof. Sheffali Gulati, Gp Capt (Dr) KS Multani, Dr. Leena Deshpande, associate editors, and the entire team for their consistent effort in producing this outstanding journal.

The time to act is now. By championing the cause of Developmental Behavioral Pediatrics, the Indian Academy of Pediatrics has the opportunity to leave an indelible mark on the health and well-being of our nation's children. Let us unite to build a healthier and more prosperous future for the youngest members of our society.

Warm regards,

Dr. G V BASAVARAJA,
Professor, Pediatrics and Critical Care,
President Elect IAP 2023.

EDITORIAL

Human conflict can have a profound and lasting impact on the mental health of children, a matter that requires careful attention and concerted efforts to address effectively. Whether the source of conflict lies within families, communities, or is a consequence of larger-scale events such as war, the repercussions on the psychological well-being of children can be extensive. This article delves into the multifaceted aspects of how conflict influences child mental health and emphasizes the importance of providing adequate support and resources to help them navigate the emotional challenges that arise in such situations.

Children exposed to conflict, especially the trauma, violence, and instability associated with war, face a heightened risk of developing severe psychological distress. Conditions like post-traumatic stress disorder (PTSD), anxiety, depression, and other mental health issues can manifest in the aftermath of such experiences. The urgency of addressing the mental health of children in war-torn environments cannot be overstated. Ensuring access to mental health services, establishing safe and supportive environments, and creating opportunities for recovery and healing are pivotal strategies to mitigate the profound impact of war on the mental well-being of children.

In the context of war, the psychological toll on children is immense, with potential consequences extending well into adulthood. The scars left by exposure to conflict can affect their ability to form healthy relationships, hinder educational attainment, and contribute to a cycle of violence if not appropriately addressed. Recognizing the long-term implications underscores the need for comprehensive and sustained efforts to protect the mental health of children affected by war.

Moreover, it is essential to acknowledge that preventive measures and conflict resolution efforts play a crucial role in safeguarding children from the traumatic experiences associated with war. By addressing the root causes of conflicts and fostering conditions conducive to peace, societies can create a protective shield around their youngest members, shielding them from the detrimental effects of violence and instability.

In conclusion, the impact of human conflict on child mental health is a complex and urgent issue that demands collective action and a holistic approach. By prioritizing the mental well-being of children in conflict zones, implementing preventive measures, and investing in resources for recovery, societies can contribute to the creation of environments that promote resilience and ensure a brighter future for the next generation, free from the shadows of trauma and despair.

We are happy to share that we got our ISSN Number (Print) 2583-9545 (P).

Best Regards

Dr. Zafar Mahmood Meenai
FRCPCH(UK)
Editor-in-Chief, IJDBP

Date Received : 16 JULY 2023 | Accepted: 29 SEPTEMBER 2023
Indian Journal of Developmental & Behavioral Pediatrics
(Official Journal of IAP Chapter of Neurodevelopmental Pediatrics)

GUIDELINE

Writing a Research Article

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Access this article online :
Quick Response Code:
Website : https://ijdbp.in
DOI : doi.org/10.5281/zenodo.10438922

Writing a research article can be a daunting task, but it is also a rewarding one. Publishing a good original research article in a reputed journal not only enhances the reputation and academic profile of the researchers but also helps to advance the knowledge in relevant field and has a potential to make a real impact. To start, it is important to understand the purpose of a research article. A research article is a formal piece of writing that presents a detailed account of an original research study. It is typically written for other researchers in the same field, and it should be clear and well-organized. Research articles are typically published in peer-reviewed journals, which means that they are reviewed by other experts in the field before they are published. This ensures that the research is of reasonably high quality and has a potential to make a significant contribution to the knowledge, practices and policy.

Research articles are usually structured into distinct sections, namely ***Introduction***, ***Methods***, ***Results***, and ***Discussion***, collectively referred to as the **IMRaD** format[1]. The Introduction section provides background information on the research topic and states the research question or hypothesis, and objectives of the study. The methods section describes how the research was conducted, including the participants, materials, and procedures used. The results section presents the findings of the research, including in the form of tables, graphs, and figures. The discussion section interprets the findings, discusses the limitations, and suggests implications for future research. Within these sections, the use of subheadings aids in further categorizing and organizing the content.

Standard reporting guidelines have been recommended for various study types. Examples include CONSORT for randomized trials, STROBE for observational studies, PRISMA for systematic reviews and meta-analyses, and STARD for diagnostic accuracy studies (Fig. 1)[2]. Following these guidelines is important as they help authors to describe their study comprehensively. This enables editors, reviewers, readers, and fellow researchers to thoroughly evaluate the research. Resources like the EQUATOR Network and the NLM's Research Reporting Guidelines and Initiatives offer valuable guidance on adhering to these guidelines[3]. Adhering to reporting guidelines enhances the transparency and accuracy of research reporting, promoting a deeper understanding and scrutiny of research findings.

Main Sections of a Research Article: The IMRaD Format

Introduction

The introduction in a research article sets the tone for the study, familiarizing readers with the research hypothesis, and motivating them to engage with the paper[4]. It guides readers from the 'why' of the research to the 'how,' directing them towards the methods section.

In essence, an introduction comprises three key elements[5]. First, it provides a background on what is already known about the research topic, establishing the foundation for the study. Second, it justifies the research by explaining if it builds upon prior work, explores a new aspect, or aims to enhance previous ambiguous results. Lastly, it states the research objectives and, preferably, presents a well-defined hypothesis.

When writing the introduction, it is important to maintain a concise and focused approach. The structure often follows a funnel approach, beginning with a broad overview of the topic and progressively narrowing down to the research problem and hypothesis. The opening paragraph introduces and contextualizes the research topic, emphasizing the need for the study. The following paragraph identifies gaps or challenges in existing research, ultimately leading to the research question. The third paragraph outlines research objectives and presents the hypothesis, offering a tentative prediction of the relationship between variables[5]. A well-crafted introduction, alongside a strong title and abstract, lays a solid foundation for the research paper.

Methods

The Methods section of a research paper is vital for describing how and why a study was conducted in a specific manner. Clarity is the key in this section; researchers must provide enough detail for others to replicate the study's results based on the available information[1]. If an external organization assisted in the research process (e.g., data collection), this collaboration should be explicitly stated in this section. It is important to state that the research obtained approval from an independent local, regional, or national review body, such as an ethics committee or institutional review board[6].

Study Setting, Duration and Design

Begin by clearly describing the study location and duration, including the source of participants or data. Specify if it is an institute/hospital-based or community-based study. Outline the study design, differentiating between primary (basic medical, clinical, epidemiological) and secondary (systematic reviews, meta-analyses) research[7]. Adhere to specific reporting guidelines endorsed by journals for precise, transparent, and standardized reporting, to facilitate accurate research evaluation.

PICO Details

Most research papers can be described by using the PICO (Participants, Intervention, Control, Outcomes) or PECO (Participants, Exposure, Control, Outcomes) format.

Participants: This entails a clear description of how participants for the study were selected, whether they were healthy individuals, patients, or controls. It should include criteria for inclusion and exclusion, as well as a description of the source population. Inclusion of a diverse and representative population is encouraged across all study types, with descriptive data on relevant demographic variables like age, sex, or ethnicity. If the study was conducted with a particular exclusive group, authors should justify this focus, except in cases where the research question directly pertains to that group[8]. The accurate use of the terms "sex" (when reporting biological factors) and "gender" (reporting identity, psychosocial or cultural factors) is important. Unless inappropriate, report the sex (or gender) of participants, animals or cells, and how it was determined[1]. Precise terminology should be used to describe participants, avoiding any language that may stigmatize them (e.g. Children with epilepsy NOT epileptics, Patients with diabetes NOT diabetics, Persons with disability NOT handicapped or challenged)

Intervention/Exposure: In experimental/ interventional studies, the details of intervention (drug, nutritional substance, educational intervention) should be clearly described. Any drugs, chemicals, scientific names, or gene names used should be clearly identified. Dose(s), route of administration, frequency of administration and duration must be stated. In observational studies, 'exposure' replaces 'intervention.' The details when an exposure (e.g. smoking) is considered to have happened must be clearly described.

Control/Comparison: In controlled and comparative studies, the procedure for selecting controls (e.g. randomization in interventional study, matching in observational studies) should also be described in detail. All details as outlined for intervention/exposure should be described for controls as well.

Outcomes: Outcomes for a research article are the pre-specified end-points of the study (e.g.hemoglobin after 12 weeks and percentage of children with anemia after 12 weeks in a study evaluating two different iron formulations for treatment of iron deficiency anemia). The study's primary and secondary outcomes should be specified. Primary outcome of the study is the one which is based on the hypothesis of the study, is the main thrust of the study, and is used for calculation of sample size. All other outcomes of interest are classified as Secondary outcomes. The methods, equipment, and procedures for evaluating these outcomes must be detailed enough for others to replicate the study. Established methods should be referenced, and modifications or new methods should be thoroughly explained, including their limitations.

Statistical Analysis and Sample Size

Statistical methods should be described in sufficient detail to enable a knowledgeable reader to assess their appropriateness and verify reported results using the original data. Findings should be quantified and presented with appropriate indicators of measurement error or uncertainty, such as confidence intervals. Beyond relying solely on statistical hypothesis testing, additional information about effect size and estimate precision should be conveyed. It is important to define statistical terms, abbreviations, and symbols and specify the statistical software package(s) and versions used. Distinguish between planned and exploratory analyses, including subgroup analyses[1].

The research article should also mention a pre-specified sample size and the basis for its calculation, with reference to other research papers from where data have been used for calculation of sample size.

Results

The Results section is a critical component of any scientific paper. It provides a clear presentation of the study's findings. Maintaining a fluent and uncluttered writing style is essential. Utilize the past tense to describe results, as the events being reported have occurred in the past[9].

Starting with the Results Section

Begin by presenting key details regarding the study participants, outlining the number of participants screened and recruited for the study. Provide information about exclusions, randomizations, and lost-to-follow-up cases, possibly using flow diagrams for clarity. Afterwards, outline their demographics and clinical features, preferably in the narrative text. Note the count of participants with missing data for each variable and include information on exposures and potential confounding factors[10].

Addressing Objectives

Start by addressing the results from primary study objective, answering the key question using appropriate statistical tests as outlined in the

methodology. Subsequently, present secondary outcomes, following the methodological order and complexity (from simple to more complicated results)[10].

Reporting Guidelines

Adhere to specific reporting guidelines based on the type of study, such as STROBE for observational studies and CONSORT for randomized control trials. These guidelines dictate the inclusion of study flow diagrams, recruitment and follow-up period dates, reasons for premature trial stops, and reporting adverse events.

Important Considerations[10]

Precision in numerical representation: Round-off numerical results to appropriate decimal points consistent with the precision of the measuring instrument or assay, as per journal requirements.

Clear presentation of P Values: Clearly state the actual P values instead of using generic indicators like P<0.05. Never state a P value as 0.000; instead, use P<0.001 for more accurate representation.

Mindful choice of words: Use 'significant' judiciously, strictly denoting statistical significance (usually P<0.05). Avoid the term when the difference is not statistically significant.

Addressing potential confounding factors: Clearly indicate adjusted estimates to account for confounders, specifying which were adjusted for and explaining the rationale.

Acknowledging negative findings: Report negative findings, as they hold equal importance and contribute to the credibility of the study.

Balancing text and tables: Ensure that the text, tables and figures complement each other; avoid repetition, and provide clarity.

Using Tables and Figures

Tables are effective for presenting complex data in a structured manner. They should convey key messages concisely without redundancy. Link the text to tables by sequential referencing. Tables can be placed sequentially at the end or within the results section as per journal guidelines. Limit the number of tables, typically2-4, and include remaining data as supplementary material. A well-constructed table should be self-explanatory with a clear heading, row/column headers, and footnotes containing essential information and abbreviations.

Figures visually convey important information, and should complement the text and tables. Select data that is best presented visually, such as trends, patterns or key insights. Legends and labels in figures should be informative, and figures should be cited and numbered in order of reference in the text. Images should be of high quality and maintain proportions.Choose the appropriate chart type based on data type and comparison needs, such as pie charts, bar charts, histograms, scatter plots, line plots, or box plots.

Reviewing

Ensure meticulous review of your data to eliminate discrepancies or inaccuracies in reporting. Inaccuracies within the results reflect poorly on the study's credibility, potentially affecting the review process. Seeking a colleague's neutral perspective for reviewing your results or the entire paper before submission can help discover unnoticed flaws.

Discussion

The 'Discussion' section explains meaning of results, validates their importance, and proposes implications and future suggestions. It shows how the research questions or hypotheses posed in the introduction have been addressed by the

results and how they contribute to understanding the research problem.

Summarising Main Findings

The discussion can be imagined as an inverted funnel, starting from precise points and broadening the scope[11]. The opening paragraph should briefly summarise the main findings, and how they answer the research questions. It should not reiterate background information or results. The significance and uniqueness of the study should be apparent.

Balanced Presentation

Both strengths and limitations should be presented. Possible alternative explanations for the study results should be considered without bias towards the proposed hypothesis. Authors should address concerns about study design, methods, sample size, and their implications on result validity[12]. Counter-arguments or strengths may also be presented.

Relating to the Literature

The discussion should be focussed on the main outcome(s) and connect the research to existing knowledge by comparing and contrasting it with similar studies. Cite previous work that supports the findings and credit other researchers appropriately. Conflicting results should be acknowledged transparently[13], and differences in design, methods, or population should be analyzed.

Implications and Future Suggestions

Practical and clinical implications should be discussed wherever applicable. Recommendations for changes in practice or policy may be proposed only when the study is of sufficient magnitude to be generalizable to the population for which the recommendations are being proposed. The discussion should also suggest specific research avenues that could enhance understanding in the field.

Conclusion

Concluding the discussion, a clear and concise statement should summarize the study without introducing new information. The conclusions must be based on the results from the present research, and alsomay reiterate recommendations for practice or further research. It should align with the manuscript's tone and content[12].

Other Facets of a Research Article

Title Page

The title page for submission of a research article to a scientific journal contains essential details about the article and its authors, including the article title, author information, disclaimers, sources of support, word count, and the number of tables and figures[1].Author information includes the authors' highest degrees and affiliations. Contact details like email addresses and phone numbers of corresponding authors are usually required. Providing the Open Researcher and Contributor Identification (ORCID) is encouraged.Authors might include a disclaimer stating that the opinions expressed in the article are their own and not representing their institution. Support sources lists grants, equipment, drugs, or other support that aided the research described in the article. The number of words in the main body of the paper (excluding abstract, acknowledgments, tables, figure legends, and references) helps editors and reviewers evaluate the appropriateness of the paper's length, and adherence to word limit. Indicating the quantity of figures and tables helps the editorial team and reviewers verify the completeness of the submission and assess space usage.The ICMJE offers a standard disclosure form for conflict of interest; however, editors may request COI on the title page for convenience.

Article Title

The title should give a quick idea of what the article is about. It plays a vital role in search engine visibility. An effective title should be "SPICED," representing Setting, Population, Intervention, Condition, End-point, and Design[14]. Setting describes where the research occurs, specifying if results are setting-specific. Population includes the target group and relevant characteristics. Intervention indicates the therapeutic or preventive action studied. Condition refers to the clinical state of subjects. Endpoint rarely appears in the title; it denotes the change due to intervention. Design, usually placed after a colon, clarifies the study type. For instance, "Effect of Parental Education on Vaccination Uptake: A School-based Intervention in Underprivileged Communities". Many journals often require a brief "running title" as a condensed version of the main title, placed in the header of published pages. It is typically limited to 50 characters, including spaces.

Abstract

An abstract is a concise summary of your paper, often the first thing editors and reviewers read. The abstract should provide a condensed view of your research, outlining its background, objectives, methods, results, conclusions, and recommendations. Critique of the research is excluded. It usually spans around 300 words or about 10% of the manuscript length. Attributes of a well-written abstract are summarized in ***Box*1**.

Abstracts can be unstructured (running text) or structured with subheadings. The structured approach could be a 4-point or an 8-point format. The 4-point abstract comprises Background, Methods, Results, and Conclusions, while the 8-point one includes Objectives, Design, Setting, Participant Details, Methods/Interventions, Outcome Measures, Results, and Conclusions.

BOX 1: Attributes of a Well-Written Abstract

Completeness: The abstract should stand alone, offering a holistic view of the research, its major components, and novelty.

Conciseness: Be precise and avoid unnecessary wordiness or redundant information.

Clarity: Keep it readable, well-structured, and devoid of jargon. Write in past tense, active voice, and steer clear of clichés or unnecessary background.

Cohesiveness: Ensure a smooth transition between sections, maintaining a chronological order as in your main paper.

Structuring the Abstract

Background and Objectives: Briefly introduce the research's existing knowledge and state the study's objectives.

*Methods:*Describe the study design, setting, participant details, interventions, outcome measures, and assessment methods. In 8-point structured abstract (mainly for experimental/ interventional studies), this section is further divided into various headings like Design, Setting, Participants, Intervention and Outcomes.

*Results:*Mention the number of participants including drop-outs. Present key findings with words, as well as numerical data, focusing on primary and secondary objectives.

*Conclusion:*Summarize the 'take home message' and significant findings. Relate conclusions to the research question and hypothesis. Express your perspective if applicable.

References

In medical writing, two main styles are commonly used for citing sources: the Harvard style and the Vancouver style. The Vancouver style is widely followed in medical journals..

Vancouver Style

The Vancouver style employs two main components for citation: in-text citation and a reference list.

*In-text citation:*Each reference is cited and numbered in order of appearance in the text. When a reference is cited in a table or figure, the citation number should follow the order in the preceding text. The numbers are typically placed in brackets or as superscripts, following the journal's policy. They appear after punctuation marks like full-stops, commas, colons, and semicolons. When citing two or more sources simultaneously, the numbers should follow the chronological order of publication, separated by commas[15].

*Reference list:*The purpose of the reference list is to provide comprehensive information for accessing the cited sources. The list is arranged in sequential order based on how the sources are cited in the text. The authors' last names are written first, followed by their initials. If there are more than six authors, the first three or six are listed as per journal recommendations, followed by 'et al.' When citing sources, capitalize the first letter of each author's last name and initials without any intervening periods. The same rule applies to the first letter of the publication title, place name, and publisher[16].

Avoid using conference abstracts as formal references. Instead, cite them within the text using parentheses. References to papers accepted but not yet published should be marked as "in press" or "forthcoming." Manuscripts submitted but not accepted should be referred to as "unpublished observations" with appropriate permissions. Ensure references are accurate and do not cite retracted articles, except when referring to the retraction itself[1]. Use authentic sources like PubMed to verify references and check for retractions.

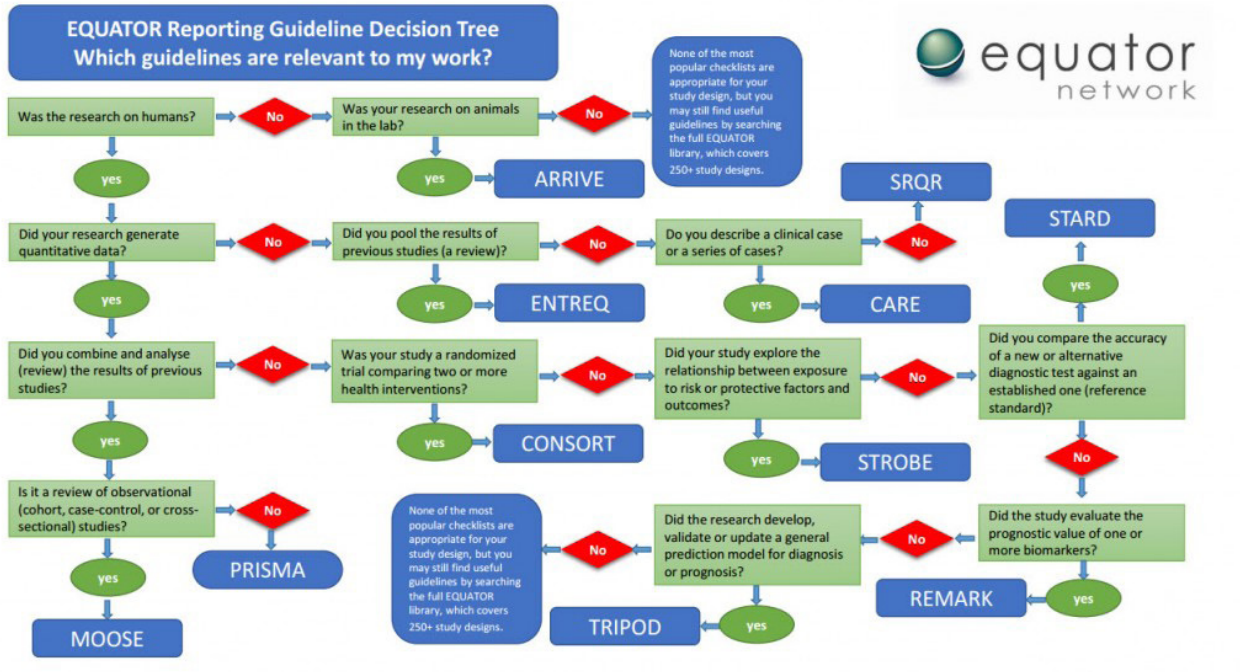

Fig. 1: Guidelines for Reporting Research (Source: https://www.equator-network.org/toolkits/selecting-the-appropriate-reporting-guideline/)

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Date Received : 17 AUGUST 2023 I Accepted: 05 OCTOBER 2023
Indian Journal of Developmental & Behavioral Pediatrics
(Official Journal of IAP Chapter of Neurodevelopmental Pediatrics)
REVIEW ARTICLE

Access this article online :
Quick Response Code:
Website :
https://ijdbp.in
DOI :
doi.org/10.5281/zenodo.10441309

Impact of the nutritional status on cerebral palsy and neurodevelopment– a scoping review.

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Source(s) of support in the form of grants, equipment, drugs or all of these –nil

Introduction

Cerebral palsy (CP) is primarily a non-progressive neuromotor disorder that affects the development of movement, muscle tone and posture resulting from injury to the developing brain. [1] The impact of Cerebral Palsy on the life of a child is not limited to functional impairment, but is multidimensional. The motor impairment also affects nutritional status, quality of life, developmental status and survival probability. [2] The prevalence of CP for all live births range from 1.5 to 3 per 1,000 live births, with variation between high-income and low to middle-income countries and geographic region. [3,4] Prevalence is as high as 59.18 per 1,000 live births among neonates weighing less than 1,500 Grams and it has remained constant over the recent decade, despite the increased survival of at-risk preterm infants. [5]

Malnutrition includes a group of conditions that refers to deficiencies, excesses, or imbalances in a child's intake, energy, or nutrients.Impaired nutrition, either under or over has devastating impact on overall health and quality of life in children with CP, resulting in increased hospital visits and reduced participation in educational and social activities. Malnutrition is frequently associated with impairment of linear growth, reduced peripheral circulation and wound healing, increased spasticity and irritability. Aetiology of malnutrition is multifactorial including both nutritional and non-nutritional factors. Among the nutritional factors, inadequate dietary intake as a consequence of oral motor dysfunction, gastroesophageal reflux and poor feeding. Among non-nutritional factors, the type and severity of underlying neurological disability, influencing ambulatory and cognitive status, and antiepileptic use are crucial factors involved in determination of the nutritional status.

Henceforth, maintenance of adequate nutrition is critical and malnutrition is common among this vulnerable population. [6–8]

Causes of nutritional problems in CP children

The causal pathway to malnutrition among children with CP is yet not clearly defined particularly in LMIC (low and middle income countries) settings, though several studies found a significant association between malnutrition, severity of motor impairment (e.g., Gross Motor Function Classification System (GMFCS) level III–V, tri/quadriplegia) and associated impairments (e.g., intellectual, speech, hearing)

Table:1 Causes of malnutrition in children with Cerebral palsy

❖ Feeding difficulties • Oropharyngeal Dysphagia • Recurrent aspirations • Oromotor dysfunction • Inadequate intake • Gastroesophageal reflux	❖ Altered metabolism ❖ Constipation ❖ Micronutrient deficiency ❖ Non nutritional factors • Cognitive impairment • Antiepileptic therapy

among children with CP. The prevalence of undernutrition increases with older age, lower intelligence quotients, and more severe neurological impairment.[9–11] The causes of malnutrition in CP may be broadly divided into nutritional and non-nutritional.(Table:1) Nutritional causes are further divided into-

1. Feeding Difficulties

The life expectancy of children with CP has gradually improved and thus, the prevalence and consequences of feeding difficulties are on the rise.

A recent data from the North American Growth in CP Project showed that 58% of children with moderate to severe CP had feeding difficulties, of which 23% were severe.[12] Feeding disorders play an important role in the development of malnutrition, documented in 29%–46% of CP children.

A. Oropharyngeal Dysphasia

Oropharyngeal dysphagia characterized by problems in any or all phases of swallowing often result in CP children having reduced lip closure, poor tongue function, tongue thrust, exaggerated bite reflex, tactile hypersensitivity, delayed swallow initiation, reduced pharyngeal motility and drooling. Impaired oral sensorimotor function can result in drooling which in turn results in impaired hydration. Problems with swallowing liquids are common and are usually related to a timing deficit with delayed pharyngeal swallow initiation. Residues in the pharynx due to reduced pharyngeal motility results in problems with thick smooth, lumpy or mashed foods. Children may appear to handle thicker food and liquid more easily, as they have more time to initiate a swallow. A clinical feeding/ swallowing evaluation or simple observation of children while they are eating and drinking, may not define the pharyngeal physiology of swallowing in the CP children. Though providing more time to complete feeding tasks may reduce their difficulty, one should be cautious as fatigue may set-in and reduced attention to the task also may become a factor. Children requiring meal time > 30 min, regularly, often point to a feeding/ swallowing problem.

B. Aspiration of food contents

Chronic aspiration is a pressing issue in this patient group with absence of cough response during aspiration events making it difficult to delineate it resulting in hypoxic events during oral feeding. Over time, as developmental gains are made, this risk of aspiration may decrease in children with CP, although it is not unusual

for them to have increasing dysphagia as they reach puberty. At this point of time changes in nutritional needs along with possible increased scoliosis or kyphosis sets in making it difficult. Further, the risks of aspiration complications are dependent partially on the initial condition of the child. [13]

C. Oromotor dysfunction

This dysfunction affects up to 90% of CP and is a major contributor to malnutrition in children with cerebral palsy. [14,15] Daily intake of nutrient depends on getting adequate food, as well as on the ability to adequately chew and swallow the food. These factors are associated with the functional status of a child with CP. Parents often report poor suck, breastfeeding difficulties, problems with the introduction of solid food and choking, prior to the making of diagnosis of CP.

D. Inadequate intake

The caloric intake of children with CP is lower than that of age-matched controls. [16] Though some patients can self-feed independently, lack of hand-mouth coordination may result in them spilling an excessive amount of food. These children may also eat more slowly than other children of same age group in the school and hence require more time to eat than is allowed by the school schedule. Hence, regular family or school mealtime may be insufficient for them to ingest a sufficient amount of food.

Severely affected children are dependent on a caregiver at mealtime and are often unable to communicate hunger and satiety. The caregiver regulated food intake may result in underfeeding because the caregiver often overestimates the time spent feeding the child or will overestimate the child's caloric intake. The caloric intake could be improved by thickening consistency and making the food calorie-dense.

Gastro esophageal reflux

Gastro esophageal reflux affecting a significant proportion of children with CP, frequently result in emesis and regurgitation, acting as a cause of caloric loss. Reflux esophagitis may be lead to food refusal, further decreasing food intake.

2. Altered metabolism

The hypotonic and non-ambulatory child requires few calories above the resting energy expenditure to thrive. But, children with hypertonic or athetoid CP may require more calories. So also are the ambulating children with mild to moderate diplegic or hemiplegic CP, often requiring more calories to perform daily activities than their normal counterparts. [17]

Most recent European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) guidelines for the evaluation and treatment of gastrointestinal and nutritional complications in children with neurological impairment supports these findings. [18]

3. Constipation

Chronic constipation (CC), frequently seen in children with cerebral palsy, is estimated to have a prevalence ranging from 26% to 74% in children with severe disabilities. Contributory factors include abnormal bowel mobility, prolonged immobility, skeletal abnormalities, generalized hypotonia and reduced fluid and fiber intake. If chronic constipation is not catered to, it gives rise to several gastrointestinal complications such as, chronic nausea, recurrent vomiting, abdominal pain, early satiety with food refusal and poor dietary intake.

4. Micronutrient deficiencies in Cerebral Palsy

Micronutrients are important for many metabolic pathways with their deficiencies causing symptoms, which are often difficult to distinguish from the general neurologic impairment of CP children. Low micronutrient levels may indeed affect cognition, behaviour, social interaction, developmental outcomes and hence quality of life. It was shown in clinical trials that biochemical deficiency of micronutrients is common in children with CP, indicating that dietary intakes of vitamins and minerals are often too low to balance needs in this population.

A study conducted by Kalra et al.(2015) comparing the micronutrient levels in 50 children with CP (aged 2–12 years) and neurologically normal age and sex matched controls found that the serum levels of iron, copper and magnesium were significantly lower in children with CP. Furthermore, the exclusively tube-fed children, may develop nutrient deficiencies, because enteral formulas may provide adequate amounts of micronutrients only when volumes consumed meet their age-related daily recommended intakes for energy. Many CP children require lower energy intakes posing them at risk for low micronutrient intake. Papadopoulos et al.(2008) found a high incidence of anemia in patients with CP , with 87% having anemia and 95.7% iron deficiency when on liquid diet.[19]

Selenium deficiency is seen in children with long-term enteral nutrition, as many medical nutrition products do not contain adequate content of selenium. Selenium is an essential trace element and a component of selenoproteins. Carnitine deficiency is relatively common in children with epilepsy. Approximately 75% of carnitine is obtained from the diet and its deficiency can cause muscle weakness, cardiomyopathy and in severe cases also hypoglycaemia, abdominal pain, vomiting and hepatomegaly. Those children on multiple antiepileptic drug therapy (especially valproic acid), young age (<10 years), neurological disability (intellectual disability, cerebral palsy and microcephaly), a diet deficient in meat and dairy products, tube feeding or parenteral nutrition are at risk of carnitine deficiency.

5. Other nutritional factors that may result in inadequate energy and nutrient intake

- Sensory factors related to the texture and taste of foods can result in the consumption of a limited repertoire of foods that may be nutritionally incomplete.
- Negative feeding behaviours related to mealtime stress or discomfort
- Disturbances in the sensation of hunger and satiety
- Dental caries and dental malocclusion affect the quantity of food consumed

Non-Nutritional Factors

Among the non-nutritional factors impacting on dietary intake and nutritional status in CP children, cognitive impairment and prolonged use of antiepileptic medication are involved.

A. Cognitive Impairment

Intellectual Disability/ Mental retardation as well as hearing, language, visual, and behavioural disorders are often associated to CP. Cognitive impairment may result in inability to communicate hunger or satiety, inability to request food and drink and to communicate symptoms. It is known through

literature that the prevalence of malnutrition increases with lower intelligence quotients (IQs). Sánchez- Lastres et al.(2003) [20] showed that malnourished children had significantly lower mean IQs than those with normal nutrition; with severity of IQ deficit increasing with increasing malnutrition levels. Similar findings were reported by others also. [21]

B. Severeity of disability

Many studies in past have [11,22,23] analysed the risk of undernutrition among CP children based on their Gross Motor Function Classification System (GMFCS) level. The odds of having moderate and severe undernutrition was 4 and 14 times more respectively, in GMFCS level IV-V when compared with GMFCS level I-III.

C. <u>Antiepileptic Therapy</u>

CP children with gastrointestinal disturbances and bone disease are often affected by epilepsy requiring a long-term antiepileptic management (AEDs).

- ***Gastrointestinal disturbances:*** These are mainly feeding difficulties including anorexia and food refusal. Additionally, nausea, vomiting and dyspepsia secondary to gastric intolerance may contribute. Rarely, diarrhoea, weight loss, abdominal cramps and constipation may also occur. The above-described gastrointestinal side effects may contribute to poor nutritional status in these children. [24]

-Osteopenia: CP children with seizures on long-term AEDs, are at increased risk for metabolic bone disease resulting in bone turnover, osteoporosis, alterations in bone quality, and fractures. Pediatric age group being a critical period for bone mineralization, this issue is particularly important. The bone mineral density is achieved by the end of adolescence and this determines the risk for pathological fractures and osteoporosis later in life. Seizure-related falls, in addition to antiepileptic treatment, pose an increased risk for fractures. Fractures are reported to be two to six times more common in patients with epilepsy than in the general population. Some AEDs like phenytoin, phenobarbital and carbamazepine are inducers of hepatic enzyme cytochrome P-450 (CYP- 450); increasing the catabolism of vitamin D and inducing a state of hypovitaminosis D with subsequent hyperparathyroidism, increased bone turnover thereby reducing the bone density. But, use of non-enzyme inducing AEDs and polytherapy have also been implicated with vitamin D deficiency and osteopenia. It is known that long-term use of VPA is associated with bone metabolism abnormalities, including reduction in BMD and changes in bone turnover, in a dose dependent way. However, the effects of the newer AEDs such as gabapentin, lamotrigine, levetiracetam, oxcarbazepine, topiramate and zonisamide on bone and calcium metabolism need further evaluation due to paucity of published evidences.

Effect of malnutrition in Children with CP

The damaging effects of malnutrition on physiology, motor function, neurological and psychological function may be particularly detrimental during early child development. These effects are due to different factors like hormonal problems, deviant motor functionality and neurological functional limitation contributing to the same.[14] In addition to growth failure,

decreased cerebral function, reduced potential for development, impaired immune function, impaired circulation with poor wound healing, diminished respiratory muscle strength, all may be seen in these children.

In addition to decreased strength of cough, the decreased muscle strength resulting from malnourishment cause recurrent respiratory tract infection in CP children. Moreover, malnutrition may hamper the resolution of these infections subsequent to lower immune function. Impaired wound healing and immunity, increases the risk of postoperative complications following surgery for fundoplication [25] and scoliosis repair. [26] It also leads to diminished immune function, causing increased susceptibility to infection.

Brooks and colleagues (2007) [27] concluded that CP children with malnutrition have a greater number of secondary and chronic health conditions than children who are better nourished. Similarly, Rempel researchers in the North American Growth in Cerebral Palsy Research Collaborative (2006) [12] noted that undernourished children with CP with low muscle mass have poorer general health; but those with low fat reserves have increased health care utilization and decreased participation in school and family activities.

Children with CP who had increased fat mass, specially fed via gastrostomy tubes were noted to have increased risk of osteopenia because of rapid accrual of body fat than bone minerals, direct effect of the excess weight on the bone and impact of the fat mass itself on the bone mineral density.

Good nutrition being a powerful prognosticator of survival in CP children at all levels of motor involvement, those who are poorly nourished are at increased risk of mortality. Hence, periodic measurement of nutritional indicators should be an important aspect of routine health care for all CP children. In addition, these parameters should be compared against reference standards, or norms to serve as a screening tool for health problems. [28]

Impact of malnutrition on developmental status of otherwise healthy children

A child's nutritional status is highly correlated with its development.[29] While the entire period of childhood is important for development, the first 1000 days (conception to age 2) are critically important for brain development; with the most rapid and prolific development of neural pathways happening then, first in sensory development, then language skills and then higher cognitive functioning.[30] Stressors during this period can substantially impact the architecture of the developing brain. Adverse events that results in malnutrition like illness (anaemia, diarrhoea, poor feeding, micronutrient deficiencies, comorbidities) can all negatively impact cognitive development.[31]

Malnutrition and Developmental status of CP children

Children with CP specially in settings of poverty are often faced with many of the above mentioned stressors. Some of these factors, if identified early enough, are potentially modifiable through intervention, such as managing feeding difficulties, treating or preventing malnutrition.[32] Nutritional rehabilitation has been associated with improved overall health, improved peripheral circulation, healing of decubitus ulcers, decreased spasticity, and decreased irritability in patients with cerebral

palsy.[33] As it is in typically developing children, development is also affected in children with cerebral palsy and malnourished CP patients may have poorer DQ scores as compared to well-nourished CP children. [34,35,36] Considering the paucity of quality data on the developmental implications of malnutrition on children with cerebral palsy, more detailed studies in this regard is required to address it.

CONCLUSION

Cerebral palsy children are at increased risk of malnutrition due to several nutritional and non-nutritional factors. Among the nutritional factors, insufficient dietary intake as a consequence of feeding difficulties is one of the main issues. Feeding problems are frequently secondary to oropharyngeal dysphagia, which usually correlates with the severity of motor impairment and presents in around 90% of preschool children with cerebral palsy (CP) during the first year of life. Other nutritional factors are represented by excessive nutrient losses, often subsequent to gastroesophageal reflux and altered energy metabolism. Among the non-nutritional factors, the type and severity of neurological impairment, ambulatory status, the degree of cognitive impairment, and use of antiepileptic medication altogether concur with determination of nutritional status.

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Date Received : 06 SEPTEMBER 2023 | Accepted: 07 OCTOBER 2023
Indian Journal of Developmental & Behavioral Pediatrics
(Official Journal of IAP Chapter of Neurodevelopmental Pediatrics)
PERSPECTIVE

Access this article online :
Quick Response Code:
Website : https://ijdbp.in
DOI : doi.org/10.5281/zenodo.10441197

Signs of Autism in Infancy

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Abstract

The first three years of life are when signs of Autism Spectrum Disorder begin to appear(1). Early diagnosis of children with Autism Spectrum Disorders (ASD) by their families is crucial, as it is becoming increasingly clear that early intervention is essential in promoting better development for these children(2). In many instances, the early signs of autism may be the absence of a skill or ability that typically develops at a given age rather than the appearance of the unexpected behaviours which are commonly present in Autism Field(3). Paediatricians should monitor infant's development carefully since the early signs may be evident if one is aware of what to look for.

Keywords: Autism, Spectrum, Centres for Disease Control (CDC)

Introduction :

The Centres for Disease Control (CDC), Atlanta, reports that most parents with autistic children notice some signs within the first year, and 80 to 90 percent observe developmental differences by the time their child is 2 years old. Retrospective videotape analyses and parental report studies suggest that symptoms can be seen during infancy. Parental recall of abnormalities in the first year of life includes poor eye contact and lack of response to the parents' voices or attempts to play and interact(4,5). Extreme temperament and behaviours such as irritability or passivity, have also been described.Reviewing home videos of the first year of life, several authors reported significantly reduced social interaction and orienting to faces and absence of social smiling as well as lack of spontaneous imitation, abnormal posture and movementpatterns(6–8). Based on the sequential review of the video material, they suggested three categories of onset patterns: "early-onset" presentation with low levels of social communication from early life, a "regression" category displaying initial high levels of social communicative behaviour followed by significant decrease over time, and a "plateau" trajectory characterized by normal initial levels of behaviour but little progress in social communication with age (9).

Discussion :

Prospective studies followed up infants discharged from the nurseries have shown the following, 1.infants who were later diagnosed to have autism, looked at bright lights longer than controls(10) 2. Infants later identified with ASD showed a mean decline in their eye fixation from 2 to 6 months of age(11) 3. high risk infant siblings (siblings of children who had Autism) took with low-risk infants between 6 and 12 months, longer latency to disengage attention

compared with normal children(12). Also restricted and repetitive behaviours, including atypical sensory responsivity, have been reported as elevated at age 12 months in high-risk infants later diagnosed with ASD(12). Some of home videos found that 12 months old infants later diagnosed with autism displayed lower quality of affect, less frequent orientation to name, and less looking at others compared to typically developing age matched peers later diagnosed with Developmental disorders(7).

Signs of Autism Spectrum Disorder seen in infancy are:

1.Declining eye contact

From young age ,babies often make eye contact with others . By the age of 2 months, babies can typically locate faces and smile when you talk to or smile at them. Later eye contact becomes means of establishing social connections and learning more about one's environment. The decrease in eye contact could be a precursor to Autism (13).

2.Limited or no response to their name

Most infants begins to respond their own names by the time they are 9months , especially when their mother calls them. Developmental trajectories of infants with Autism can vary, many do not turn or stop when they called by their own names even after 9 months of age. Researchers say this usually appears as a pattern of nonresponse, rather than a single instance(3).

3. Gesturing and joint attention

Babies usually learn to gesture before they learn to talk. In fact, gesturing is one of the earliest forms of communication. Baby usually start waving bye by 10 months. Autistic children generally gesture much less than children with normal development trajectory. Children points to objects they want by the end of first year. Many children with autism don't point to the object, but they may hold their parents hand and directs them what they need. During this action they do not look at the parents face(this sometimes called " instrumental pointing ")(14). The ability to focus on an object or area when another person points at it is known as joint attention. Infants typically developing display joint attention as early as 6 to 9 months of age. Infants with Autism have difficulties with displaying joint attention(3). They tend to look somewhere else when parents are pointing to something or may look at the parents' fingers or arms. Showing joint attention is a critical step within a child's social and language development.

4.Delayed or absent development of speech

Babies typically begin speaking one or two meaningful words by the end of their first year. The first words are usually kinship words ("mama","pappa","dadda"orwordapproximation for what they want – "mumumm" for food). Parents frequently misinterpret the meaningless babbling of many autistic youngsters. A word or sound needs to have a purpose (to ask something more to indicate something ,or to have the chance to engage with another person) in order to be considered meaningful. Many infants with early autism symptoms don't start using words with meaning until later in life, and they have delay expressive and receptive language(12).

5. Lack of interest in people

Many infants who have early features of Autism avoid activities with children normally enjoy, like cuddling or kissing. They often ignore their family members or caregivers. Sometimes they don't cry or show any signs of apprehension

even left with strangers. By age of 9months reduced eye gaze, facial expressions, gestures and vocalizations during interactions have been observed in infants later diagnosed with Autism(13).

6.Difficulty with social play

Peekaboo is a game that most parents or caregivers play with their infants and babies enjoy playing peekaboo as early as 6 months. The mother hides her face , babies become excited. However, a lot of autistic infants do not react enthusiastically when they see their mother's face and instead turn away or focus on the cloth.

7.Temperaments

Researchers discovered that there were some behaviours that set apart infants with autism from their siblings even at age of at 6 months of age(15). At 6 monthsage , they have a docile temperament and showed less interest in their environment. Later, as they got closer to 12 months age , they became extremely irritable , had the propensity to focus on things, engaged in less social interaction, and lacked facial expression. In addition, temperament differences can impact behaviours and psychopathology indirectly by changing the way in which adults interact with the infant, altering their experiences(16).

8.Unusual body movements

Babies with autism before 12 months may display unusual body movements, such as hand flapping, rocking, or spinning(12). Unusual responses to sensory input, such as avoiding touch or being hypersensitive to certain sounds also noted in first year(17).

9. Unusual play patterns

Children love exploring new toys and look at parents frequently when they are playing with toys. By first year , they start using toys in functional way. Infants who develop autism either avoid toys or do the same action (eg.keep banging the toy every time in a similar way) or they may do unusual things like turning a the toy car over and playing only with wheels of the car(18).

10. Delayed motor skills

By age of 6-9months, delayed sitting, delayed reach to grasp and delayed goal directed reaching observed in infants with Autism(19). However delayed motor skills should be considered high risk for autism only if there is delayed or deviant social and language milestones.

Conclusion

There are many early clinical features the are predictive of autism. A high index of suspicion, an open mind, and frequent follow-up of the infant who has unusual behaviours are extremely important in making early diagnosis of Autism.

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Date Received : 14 SEPTEMBER 2023 I Accepted: 06 OCTOBER 2023
Indian Journal of Developmental & Behavioral Pediatrics
(Official Journal of IAP Chapter of Neurodevelopmental Pediatrics)
CASE REPORT

Access this article online :
Quick Response Code:
Website :
https://ijdbp.in
DOI :
doi.org/10.5281/zenodo.10438888

Iron deficiency anemia presenting with behavioral problem in prolonged exclusive breast – fed infant.

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Abstract :

Iron deficiency is a common nutritional problem in infants and children and in adolescents with obesity. Exclusive breast feeding for prolonged period can result in iron deficiency anemia in late infancy and early childhood (1).

Iron deficient children during development are particularly prone to impaired cognitive and behavioral functions. Verbal learning and memory can be affected in these children (2,3).

Infants and children with iron deficiency state are also found to score low on mental development index (MDI) in Bailey scales of infant development (BSID), and scores of such infants usually increase after proper iron therapy (1,4).

We present here a baby boy of 2 yrs who attended the outpatient clinic due to fidgety and overactive behavior for previous 5 to 6 months. He had a normal growth and development after a normal birth and postnatal period. He had been given exclusive breast feeding by his mother since his birth without any attempt to wean him. On evaluation he was found to have moderate iron deficiency anemia. He was treated with oral iron in a therapeutic dose and gradual weaning from breast milk of his mother and introduction of other nutritional supplements. He showed clinical and hematological improvement in following 2 months. His behavioral problem and fidgetiness also improved.

Case report:

A 2 yr old boy, the first child of non-consanguineous parents from a lower socio-economic community presented with history of multiple episodes of breath holding spell and fidgety behavior for a period of 5- 6 months. He did not have any history of convulsion, fever or chronic diarrhoea. Earlier, the baby suffered from two episodes of febrile seizure, one at his 6 months of age and other at 10 months, both of which responded to treatment with paracetamol and diazepam (prn) for 2 -3 days during the febrile paroxysms. The parents also complained that the baby was inattentive and overactive and he would not listen to his parents and relatives. Dietary history revealed that the boy had been exclusively breastfed by his mother since his birth and was not given any other food or milk/milk product as the baby would not take anything except breastmilk from his mother. There was no history of any bleeding disorder or passing blood with stool or urine. There was no history of PICA or ingestion of lead containing substance what so ever.

His birth and neonatal history was unremarkable. Growth and developmental history, as obtained from the parents, did not reveal any significant

abnormality. The baby was immunised according to schedule from birth till date.

On examination, his growth parameters (weight 10 kg, height 83 cm, head circumference 47 cm, chest circumference 45 cm) were within normal range. His developmental milestones since birth were not delayed or abnormal. He could follow 2 step command and build a tower of 6 cubes, and walk alone, run with occasional fall, and climb upstairs holding railing one step at a time.

General examination showed moderate pallor.

Icterus, clubbing, edema were absent.

Systemic examination of chest, abdomen and cardio vascular system were normal. There was no hepatosplenomegaly.

He showed inappropriate behavior and impaired attention, but his motor skills were normal. His language development was normal as could follow 2 step command and speak 2 word sentences.

Hematologic investigation including peripheral smear showed moderate microcytic, hypochromic anemia (Hb 7 gm/ dl, PCV 20%, RBC count 3.2 million /cu mm). MCV was 64, MCHC 27% (approximately). No basophilic stippling found in RBC, and serum lead level was normal. There was no abnormal or immature cell in blood. Reticulocyte count was normal.

Serum iron was low (14 mcg/ dl) with increased TIBC (468), and low ferritin (11 nanogram / ml).

His liver function and renal function tests did not show any abnormality.

Electroencephalogram (EEG) was normal.

A diagnosis of iron deficiency anemia was postulated and the cause considered was nutritional deficiency due to prolonged exclusive breast feeding leading to insufficient iron supplements in his feeding.

The baby was treated with oral iron 5 mg elemental iron per kg body weight per day in 2 divided doses. This was continued for 2 months after which his hematological parameters became normal. During this period his parents were counselled to gradually wean the baby from breast milk and to supplement his diet with cereals like soft rice, roti and dal, suji, etc. Oral iron therapy was continued prophylactically in a dose of 2 mg elemental iron per kg per day for another 2 months. After 2 months the baby showed significant improvement in attention and hyperactive behavior.

Discussion :

The 2 yr old boy presented with fidgety behaviour and anemia. Iron deficiency was the cause of anemia as his serum iron and ferritin were decreased and TIBC was elevated. Low MCV and MCHC were consistent with microcytosis and hypochromia respectively. Thalassemia and hemoglobinopathies were excluded due to absence of hepatosplenomegaly, and normal hemoglobin electrophoresis. Absence of pica and basophilic stippling of RBC excuded lead intoxication.

Prolonged exclusive breastfeeding extending beyond 1 yr of age can predispose to iron deficiency due to lack of cereal containing food in infant's diet (1). Though breast milk iron has a good bioavailability, about 50 percent of ingested iron in breast milk get absorbed in small intestine, it may be insufficient to provide adequate iron to the baby after 9 to 15 months of life unless some cereal containing food is added to the infant's diet with weaning (1,2).

Incidentally,the parents of the baby sought

medical advice predominantly due to the behavioural disturbance, which is prone to occur in iron deficiency (3,4).

Oral iron therapy continued for 6 to 8 wks after hematologic improvement can replenish the stored iron and also result in improvement of behaviour and intellectual function in young children (4,5,6).

Conclusion :

Prolonged breastfeeding and delayed weaning without supplements can lead to iron deficiency anemia in infants and young children. Those with anemia should be initially evaluated for having iron deficiency and treated accordingly. Proper and timely weaning from breast milk and introduction of cereal in baby's diet should protect the baby from nutritional iron deficiency anemia.

Also, infants and children with behavioral disturbance should be evaluated for associated iron deficiency anemia and treated accordingly before being levelled as attention deficit hyperactive disorder (ADHD).

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Date Received : 01 SEPTEMBER 2023 | Accepted: 08 OCTOBER 2023
Indian Journal of Developmental & Behavioral Pediatrics
(Official Journal of IAP Chapter of Neurodevelopmental Pediatrics)

PERSPECTIVE

Access this article online :
Quick Response Code:
Website :
https://ijdbp.in
DOI :
doi.org/10.5281/zenodo.10441243

Everything We Need to Know about Autism Spectrum Disorder

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Abstract:

Autism Spectrum Disorder(ASD) is a complex neurodevelopmental condition characterized by deficits in social interaction, communication difficulties and repetitive behaviors that profoundly impacts the lives of affected individuals and their families .This article provides comprehensive overview of ASD, focusing on screening, diagnosis and intervention strategies.

Early signs of ASD can manifest as early as six months, but parents may not recognize them until their child falls behind in meeting social milestones. This delay in recognition is often due to a lack of awareness, societal stigma and limited knowledge about developmental and behavioral disorders.

Globally, ASD prevalence is on the rise, potentially due to broader diagnostic criteria, increased awareness and improved screening practices. Screening for ASD is crucial for early identification and intervention. Various tools are available such as Modified Checklist for Autism in Toddlers (M-CHAT), Trivandrum Autism Behavioral Checklist (TABC)and the Social Communication Questionnaire (SCQ) .Diagnosing ASD involves using established criteria such as the DSM-5(Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition) and specific diagnostic tools like the Autism Diagnostic Observation Schedule (ADOS) and the Indian Scale for the Assessment of Autism (ISAA).

Interventions for ASD should be multidisciplinary, involving professionals such as developmental pediatrician, psychologist, special educators, occupational therapist, speech therapist and social workers. Applied Behavior Analysis(ABA),Naturalistic Developmental Behavioral Interventions(NDBIs) and parent mediated treatment are among the evidence based approaches.

Additionally, speech-language therapy, motor therapies and sensory integration therapy play vital roles in addressing the diverse needs of individuals with ASD. Medical interventions should be used alongside behavioral and environmental strategies.

Early screening accurate diagnosis and tailored interventions are essential for improving the lives of individuals with ASD.A multidisciplinary approach and increased awareness are crucial in addressing the growing prevalence of ASD worldwide.

Key words: Autism Spectrum Disorder, Screening, Multidisciplinary, Diagnostic Criteria, Sensory integration therapy

Introduction:

Autism Spectrum Disorder (ASD) is a neurological disorder characterized by limitations in social interaction, social communication, and repetitive, restricted patterns of behavior [1]The two main domains that make up the core characteristics of autism are deficits in social interaction and communication as well as constrictive, repetitive behavioral patterns. It is a neurodevelopmental conditions with major life altering implications and high rates of medical and psychiatric comorbidities.[2,3]"Spectrum" in ASD indicates that each individual is affected in different ways, with mild-to-severe symptoms often with overlapping comorbidities.

The earliest indications of autism can be seen as early as 6 months, but parents may not notice them until their kid falls behind other youngsters his or her age in meeting social needs. When their child cannot verbally communicate in the early years, parents of autistic children grow increasingly concerned.Parents gradually notice social impairments as children become more ambulatory. Parents couldn't notice signs and symptoms of ASD at earlier age mainly because of not being aware of this condition, profound ignorance and social stigma in society regarding developmental and behavioral problems. In 2016 ASD is included in disability certification under Indian Rights of Persons with Disability Act.

Although there is no conclusive evidence to support the precise cause of autism, numerous studies conducted globally suggest that many genetic or chromosomal conditions, such as fragile X syndrome or tuberous sclerosis, complications during delivery and a stay in the neonatal intensive care unit, and children born to older parents have a higher risk of developing ASD than children without these conditions. The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition clubs all subgroups of autistic disorder, including Asperger syndrome and pervasive developmental disorder (PDD), as single entity ASD.[1]

Disease Burden in India and World:

Once considered as a rare disorder, autism spectrum disorders affects as many as 1 in 65 children in age group of 2-9 years in India. [4] Autism is contributed as serious public health problem in India because as many as 1.8–2 million children said to be affected with autism spectrum disorder. A recent systematic review of the South Asian (Bangladesh, India, Sri Lanka) population has reported prevalence rate of 0.09% to 1.07% among children in 0–17 years with ASD.[5]ASD affects more than 5 million children in America , with an estimated prevalence of 1 in 59 approximately 1.7%.[6]Systematic research is lacking in the field of autism in India as compared to developed countries because of which many cases goes undiagnosed resulting in reduced prevalence rate than actual value. So cases which come to health facility can be just a peak of an iceberg, many cases are still hidden and undiagnosed.

Prevalence of ASD is increasing drastically all over the world causing societal impact of ASD.[7,8,9]Increasing prevalence of ASD can be because of several factors such as broadening of diagnostic criteria with repeated timely revisions of the Diagnostic and Statistical Manual of Mental Disorders (DSM) along with pervasive developmental disorder and other autisticconditions considered as single entity as ASD in recent time. Public awareness about symptomology of condition and increased

practice of universal screening for ASD by health practitioner lead to early and increased detection of children with autism.Easily available facilities of early intervention and active school participation in providing school-based services for children with ASD might add to increased prevalence.[10]

Symptoms of ASD:

ASD children have characteristic features which are abnormal variation in normal social and ritualistic behavior for children of that age. ASD presented with main two core features i.e. deficit in social communication/interaction and restricted, repetitive patterns of behavior as described in the DSM- 5.[1]Lack of social communication/interaction can manifest as abnormalities in initiating and maintaining back-and-forth conversations, failing to respond to others by name, making very poor eye contact while speaking with them, using gestures in unusual ways, failing to understand imaginative play, and displaying very little interest in other kids.

Restrictive repetitive patterns of behavior can take the shape of a set routine and interests, repetitive body movements (such spinning and flapping the hands), echolalia, and unusual processing of sensory stimulus from the auditory, visual, and tactile senses.Children with ASD frequently have co-morbid conditions, which have a severe negative impact on how well the kid and family function as well as on management. Developmental or behavioral issues, such as attention-deficit/hyperactivity disorder (ADHD), anxiety, mood disorders, sleep disorders, and seizures are frequently present coexisting comorbidities with autism spectrum disorder (ASD). Food refusal, constipation, self-injury, aggressiveness, and depression are additional prevalent issues. [11]

Need of Early Screening in ASD:

Many recent studies and research done all over globe came with outcome of increased in prevalence of ASD worldwide which lead to targeting our focus to identify children with signs of an ASD as early in development as possible and optimal early intervention in the toddler, and preschool children. Reliable age to identify and diagnose ASD could be as low as 2 years as observable symptoms are present in this age.[12] Autism screening is a very effective way to standardized process to keep a watch so that children are systematically and regularly monitored for early signs of ASD which will ultimately lead to earlier diagnosis which in a long term helps to reduce delays and encourage early intervention to reduce disease burden in society.[13]Recent systematic studies done all over the world in different cultural settings have proved that early intervention can improve outcomes mainly in core features of ASD , IQ, language outcome, and symptom severity.[14,15] Universal screening for ASD for all children has been recommended during well-child visits at ages 18 and 24 months along with developmental screening by the American Academy of Pediatrics (AAP).[16]

Screening Tools for ASD:

Screening tools are small questions based brief assessments for identifying children at risk of a neurodevelopmental disorders such as autism. Autism being a behavioral diagnosis, it's very important to mainly focus on autism specific observable behaviors while developing a screening tool. Screening tools based on parents report are easy to administer and require less of

a professional assistance but close vigilance is needed while interpreting by a professional as some parents specially first time parents, may be unaware of appropriate developmental milestones and atypical pattern of behavior in their children. Commonly used screening tools are listed below (Table 1).

Table I – Screening Tools for ASD

Sr. No.	Name of Screening Tool	Age group for application
1.	Modified Checklist for Autism in Toddlers (M-CHAT)	16-30 months
2.	Trivandrum Autism Behavior Checklist (TABC)	2-6 years
3.	Social Communication Questionnaire (SCQ)	4 years and above
4.	Autism Behavior Checklist (ABC)	18 to 35 months
5.	Ages and stages questionnaires (ASQ)	6 months to 5 years
6.	Screening Tool for Autism in Toddlers (STAT)	24 to 35 months
7.	Communication and Symbolic Behavior Scales Developmental Profile (CSBS DP)	6 to 24 months
8.	Parents' Evaluation of Developmental Status (PEDS)	birth to 7 years and 11 months
9.	Indian Autism Screening Questionnaire (IASQ)	3-18 years
10.	Chandigarh Autism Screening Instrument (CASI)	1.5–10 years

M-CHAT:

A free screening tool that is available in many different languages is the Modified Checklist for Autism in Toddlers, Revised with Follow-Up (M-CHAT R/F). It is a two-stage parent report that takes around 10 minutes to complete and comprises 20 closed-ended questions with Yes/ No responses to screen children between the ages of 16 and 30 months who are at high risk for ASD.[17] Children who score higher than 8 are at a high risk for ASD or another developmental problem and should be sent for a diagnostic evaluation to confirm the diagnosis. Children who scored between 3 and 7 should go through additional interview questions for the items that were positive. Children who continue to score between 3 and 7 items positively for ASD should be referred for a diagnostic evaluation. Scores below 3 are considered to be negative for ASD.

TABC:

Autism Behavior Checklist of Trivandrum TABC test is a straightforward instrument created by the Child Development Center at the Medical College in Thiruvanthapuram, India, whose evaluation results were compared to the Childhood Autism Rating Scale (CARS).[18] The four developmental domains of social interaction, communication, behavioral traits, and sensory integration are evaluated by the TABC. Responses include never (1), occasionally (2), frequently (3), and always (4).It also helps to classify autism according to severity, with scores of 20 to 35 denoting non-autism, 36 to 43 denoting mild to moderate autism, and 44 and higher denoting severe autism.[19]

Social Communication Questionnaire (SCQ):

Previously it is called as Autism Screening Questionnaire, was derived from the ADI-R. It's available in many Indian languages and is often considered the gold-standard questionnaire used in many autism research studies.[20]The SCQ have 40 questions with answers in yes or no to be completed by parents. It is available intwo forms i.e. less than 6 years and more than 6 years. It takes less than 10 minutes for caregiver/parents to complete the test and less than minutes to score it.

Autism Behavior Checklist (ABC):

Children between the ages of 18 and 35 months can benefit from the autism screening tool known as the Autism Behavior Checklist (ABC). It assesses 57 behaviors in five different domains: social, relational, body and object usage, language, and sensory. The checklist can be completed by parents or instructors since they are fully aware of the many behaviors that children exhibit.

Ages and stages questionnaires (ASQ):

The parent or primary caregiver should fill out this general developmental screening tool. It consists of 19 age-specific questions with a pass/fail response for 19 different developmental categories, including communication, gross motor, fine motor, problem-solving, and personal adaptation skills.

Screening Tool for Autism in Toddlers (STAT):

It is an activity-based screening tool made for kids who are at high risk for neurodevelopmental disorders like autism. The administration of the assessment, which is done in 12 different tasks including play, communication, and imitation abilities, takes about 20 minutes. Children 24 to 35 months old can participate in it as an interactive session.

Communication and Symbolic Behavior Scales Developmental Profile (CSBS DP):

The Communication and Symbolic Behavior Scales Developmental Profile was developed as a screening tool by Wetherby and Prizant. The Infant/Toddler Checklist, which evaluates communication and symbolic behavior, is the first step in a routine. Children between the ages of 6 and 24 months are screened with this test. If the first step doesn't work; the kid must assess communication with the other two CSBS DP components, namely the follow-up Caregiver Questionnaire and Behavior Sample (BS), based on the response.

Parents' Evaluation of Developmental Status (PEDS):

A 10-item questionnaire that parents must answer as part of the PEDS screening tool focuses mostly on behavioral and developmental issues. It is used for kids from birth to seven years and eleven months old and aids in the early detection of kids who exhibit indications of autism.

Indian Autism Screening Questionnaire (IASQ):

The Indian Scale for Assessment of Autism (ISAA), a frequently used diagnostic test for autism in India, served as the basis for the Indian Autism Screening Questionnaire (IASQ).This 10-item questionnaire has a yes/no response format and requires little training to use, making it crucial in areas with few medical services.

Chandigarh Autism Screening Instrument (CASI)

Chandigarh Autism Screening Instrument (CASI) specifically designed for community screening with the help of health workers. It is a 37-item questionnaire-based tool for children between 1.5–10 years.

Diagnostic Tools for ASD:

Children who are positive or high risk in screening tools should undergo evaluation for diagnostic tools for the confirmation of diagnosis. Different diagnostic tools are available but a DSM-5 criteria is an easy and comprehensive diagnostics tool for initial diagnosis by general pediatrician and child psychologist. Formal assessment of hearing,vision and cognitive skills along with complete physical examination is of crucial importance before diagnostic assessment of ASD. Commonly used screening tools are listed below (Table 2).

Table II: Diagnostic Tools for ASD

Sr.No.	Name of Screening Tool	Age group for application
1.	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)	Above 1 year
2.	Autism Diagnostic Observation Schedule (ADOS)	Above 1 year
3.	Indian Scale for the Assessment of Autism (ISAA)	3-9 years
4.	INCLEN Diagnostic Tool for Autism Spectrum Disorder (INDT-ASD)	2-9 years
5.	Childhood Autism Rating Scale (CARS)	2 years and above
6.	Autism Diagnostic Interview Revised (ADI-R)	2 years and above
7.	Gillian Autism Rating Scale (GARS)	3-22 years

Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5):

The basic symptoms in the DSM-5 were divided into two categories: restricted, repetitive behavioral patterns and social communication and interaction. The DSM-5 requires that two of the four symptoms linked to restrictive and repetitive behaviors, along with all three symptoms of social emotional reciprocity, be present in order for the diagnosis of ASD to be made.[1]The DSM-5 also helps in grading severity of ASD. It is a very easy to admister tool for pediatricians and child psychologists so that child can be started on early intervention at the earliest.

Autism Diagnostic Observation Schedule(ADOS):

The Autism Diagnostic Observation Schedule was the first instrument for diagnosing ASDs that was standardized and performance-based. It helps in the evaluation of social play and communication through a series of “planned social occasions” that provide the youngsters the chance to respond to varied social circumstances. The ADOS consists of four 30-minute units. Each module is designed to assess the child at the appropriate linguistic and developmental level. Children as early as 12 months old can have ASD diagnosed using the ADOS-2 (Autism Diagnostic Observation Schedule, Toddler Module). [21]

Indian Scale for the Assessment of Autism (ISAA):

There wasn't previously a scale that was suitable for use in an Indian context because the bulk of scales were developed in western countries.[22] The National Institute for the Mentally Handicapped developed the Indian Scale for the Assessment of Autism (ISAA), a diagnostic test for autism in India, in 2009 to solve this problem. The ISAA is a locally developed and standardized diagnostic tool for ASD. The ISAA includes screening questions on behavioral patterns, sensory and cognitive abilities, emotional receptivity, speech, language, and communication, as well as social interaction and reciprocity. It takes 45 to 60 minutes to administer and requires training. It is a comprehensive 40-item tool that relies on information from parents and a child's observation. It can be used for follow-up and certification, but not for screening in population research.[23] The ISAA score ranges from 40 to 200, and as the number rises, so do the severity of the disorders.

INCLEN Diagnostic Tool for Autism Spectrum Disorder (INDT-ASD):

Diagnostic Tool for Autism Spectrum Disorder developed using DSM-5 criteria created by AIIMS (INDT-ASD). It has a sensitivity of 98.4% and specificity of 91.7% to diagnose ASD. [24]The tool has two sections: Section A1 (1a, 1b, 1c) covers item related to social communication deficit type of symptoms of ASD and A2 (2a, 2b, 2c, 2d) covers restrictive repetitive behavior related symptoms which are 2 core domain of DSM-5. The process of scoring and administering the test takes about 45 to 60 minutes. Regarding peer interaction and play skills, it takes into account the diverse ethnic and religious variety prevalent in this country with its vibrant culture. It is to be utilized by trained individuals and is based on both direct observation of a child between the ages of 2 and 9 years old as well as history from primary caregivers.

Childhood Autism Rating Scale (CARS):

Because it was created mostly by people with concurrent intellectual functioning, the original CARS was criticized for failing to accurately identify better functioning autistic individuals.[25] The CARS-2 is an upgraded version of the Childhood Autism Rating Scale (CARS). is the most widely used behavioral rating scale for children older than two. The CARS-2 retained the original CARS form (now known as the CARS2-ST for "Standard Form") for use with children under the age of six or older but with an estimated IQ of 79 or less.

A special rating scale known as the CARS2-HF for "High Functioning" was developed for kids aged 6 and older with an estimated IQ of 80 or higher and fluent communication. To collect data from parents, use the CARS2-QPC (Questionnaire of Parent Concerns), an ungraded form for parents to report observations. The 15th category on the childhood autism rating scale (CARS), which consists of 15 categories, assesses how people perceive autism generally. The first 14 domains look at autism-related characteristics like verbal-nonverbal communication and restraint.

The severity of the impairment is indicated by a number between one and four assigned to each domain. The severity of the impairment is indicated by a number between one and four assigned to each domain. Total scores can range from 15 to 60; numbers under 30 are seen as being within the normal range, 30-36.5% is regarded as being mild to moderate autism, and 37-60% is regarded as being severe autism.

Autism Diagnostic Interview Revised (ADI-R):

A diagnostic approach that emphasizes behavior in three main areas namely reciprocal social contact, communication and language, and limited and repetitive, stereotyped interests and behaviors can be used to identify children and people with autism. The ADI-R can be used by children and adults with mental ages of at least 18 months. This measure includes a standardized, in-depth parent interview lasting 1.5 hours for parents of 3 to 4 year olds and older children, and 3 hours for older children.

Gillian Autism Rating Scale (GARS)

By using this scale, schools, parents, and medical professionals can detect and diagnose autistic children between the ages of 3 and 22. It also assigns an ASD severity rating. It is a 42-item norm-referenced screening tool that includes a developmental history and collects data on certain traits frequently seen in kids with autism spectrum disorders in three domains (stereotypical behaviors, communication, and social interaction).

Key Points to Remember while Using Screening or Diagnostic Tool:

The AAP does not recommend any specific screening method, but recommendations clearly say that kids who receive a positive or at-risk result at any time should be referred.[26]Effective screening tools exist but are not regularly utilized because of variety of factors including a lack of training in the use of tools, lack of awareness about the condition or a lack of time and resources. Screening and diagnostic tools should be used considering cultural and language preferences in that country. As prevalence of ASD has increased drastically worldwide effective screening of children at early age will help for early identification and initiation early intervention which in long term seen as positive outcomes in form of improvement in communication, social interaction and cognitive development.

Different Intervention for ASD:

Because of complexity of Autism, the assessment and management should be with the help of multidisciplinary team which consist of developmental pediatrician, psychiatrist, psychologist, a special educator, an occupational therapist, an audiologist, speech therapist and social worker.

Applied Behavior Analysis (ABA):

To significantly alter socially significant behaviors and demonstrate how interventions result in improved behavior, it is based on learning theory concepts. Treatments utilizing ABA may concentrate on improving already-present skills (like social engagement) or minimizing harmful behaviors (like aggression) that might obstruct a child's development.

Naturalistic developmental behavioral interventions (NDBIs):

The administration of therapies within the context of naturally occurring social activities inside natural surroundings is a feature of naturalistic developmental behavioral interventions (NDBIs), which combine components of ABA and developmental principles. These therapies emphasize essential social learning abilities and learning objectives that are based on developmental stages.

Parent-Mediated Treatment

Numerous studies have shown that concentrated interventions delivered by trained parents or other caregivers can be beneficial to a therapeutic program.[27]Students with ASD should normally

be educated in the least restrictive environment possible using the Treatment and Education of Autism and Related Communication Handicapped Children (TEACCH) curriculum and an individually tailored program adjusted to meet the goals of the Individualized Education curriculum (IEP).

Speech-language therapy

Speech-language therapy is the intervention that is most usually utilized with children who have ASD. [28]Children who struggle with conversational skills may benefit from using AAC (augmentative and alternative communication). AAC methods include sign language, the Picture Exchange Communication System (PECS), and speech-generating equipment. [29]

Motor Therapies:

Children with ASD may have hypotonia and coordination difficulties. The use of occupational therapy services is recommended to support fine motor and adaptive abilities, such as self-care, using toys, and handwriting. Toe walking is common among children with ASD which respond well to passive stretching, orthotics, and casting.

Sensory Integration Therapy

"Sensory Integration Therapies for Children with Developmental and Behavioral Disorders," offering clinicians crucial baseline knowledge and suggestions common sensory-based therapies include skin brushing, wearing weighted vests for proprioceptive stimulation, or engaging in kinesthetic stimulation. Play and sensory activities with child helps to improve sensory responses.

Medical Interventions:

Always utilize medication in conjunction with the proper behavioral and environmental interventions. For the treatment of co-morbid psychiatric or neurodevelopmental problems, as well as behavioral symptoms that impair the child's ability to work on a daily basis, pharmaceutical therapy may also be necessary. Risperidone, Aripiprazole (maladaptive Behaviors), Methylphenidate, Atomoxetine (ADHD), Fluoxetine (Repetitive Behaviors and Rigidity), Melatonin, and Serotonin (Sleep Disturbances) are some of the medications frequently used in ASD.

Summary:

ASD is neurodevelopmental condition with a varied presentation mainly causing impairment in social communication and restrictive repetitive activities in children with associated comorbid conditions. Because of its diverse behavioral problems child along with the family has to go through adjustment issues while living in the society. Screening of autism at the early age along with appropriate diagnostic method can play a pivotal role for future outcome of these children. Multidisciplinary approach should be built while managing patient with ASD.

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Printed by and published by Dr. Zafar Mahmood Meenai on behalf of IAP Chapter of Neurodevelopmental Pediatrics and printed at Aadarsh Pvt Ltd, Shikhar Varta, 4 Press Complex, Bhopal -23 and published at Z-30, Meena Tower, Polytechnic Main Road, Civil Lines Bhopal (MP) 462002
Editor Dr. Zafar Mahmood Meenai.