

## Digital media and Child Development : An ayurvedic and Contemporary Review

\*Rituraj Tripathi

Department of Rasashastra Evam Bhaishajya Kalpana  
Shri Lal Bahadur Shastri Smarak Government Ayurveda College and Hospital,  
Handia, Prayagaraj - 221503 (India)  
**Corresponding author : Dr. Rituraj Tripathi**  
[rituraj.ayu@gmail.com](mailto:rituraj.ayu@gmail.com)

### Abstract

Child development involves biological and psychological growth from dependency to autonomy, explained in Ayurveda through *Sharira Vriddhi*, *Manasika Vikas*, and the balance of *Dosha*, *Agni*, *Ojas*, *Satva*, and *Bala*. In the 21<sup>st</sup> century, television, computers, mobiles, online games and use of AI (Artificial Intelligence) have become integral to children's lives. With increasing availability of digital media, adolescents are exposed to global information, often unsupervised, leading to harmful behaviours such as aggression, unsafe sex, and substance use. The electronics market in India grew from US\$ 11.5 billion in 2004 to US\$ 40 billion by 2010, surged to US\$ 73.3 billion in 2021, and reached US\$ 180 billion in 2024, with projections of US\$ 300 billion ahead. Yet, research shows excessive exposure retards language development, displaces normal learning, and causes poor sleep, irritability and developmental delays. Thus, Digital Media are mixed blessings, and balanced parental regulation is essential to safeguard child health and development.

**Key words :** Child development, Ayurveda, Ayurvedic, Digital Media, Television, Computers, Internet, Mobile, Screen time, Behavioural effects, Artificial Intelligence, AI.

Child development is the study of mechanisms that operate during the biological and psychological process of growth of a child to adolescence, from dependency to increasing autonomy. Milestones are the major focus of child development stages. In Ayurveda, this process can be understood through the concepts of *Sharira Vriddhi* (physical growth), *Manasika Vikas* (mental development) and the influence of *Dosha*, *Agni*, *Ojas*, *Satva* and *Bala* on overall child health. Developmental disability is a term used to describe lifelong

disabilities attributed to mental or physical or both combination of mental and physical impairments. This use of term is synonymous with the use of term learning disability, intellectual disability or cognitive disability. In Ayurvedic understanding, such conditions may be associated with *Beeja dosha*, *Garbha dosha*, or disturbances in *Vata*, *Pitta* and *Kapha* during intrauterine or early postnatal life.

Many theories have been put forward on child development. The basic idea behind them is that, children learn in stages. Each stage can have lasting effects on adult personality. Many Children develop defence mechanisms against unpleasant ideas or threats. Unpleasant childhood experiences could leave lasting scars, which would affect how that person would react to new situations and events. One of the most famous theories about how a child's mind develops was put forward by Swiss psychologist, Jean Piaget. The central concept of Piaget's theory is the schema. A schema is a kind of cognitive or mental structure, which the child uses as it interacts with the outside world. A schema contains all the ideas, memories and information about a particular object that a child associates with that object. Once the schema is developed, it will be applied to other situations if at all possible. Many people think that intelligence is inherited, but this could be environmental too. So we can conclude easily that the later stages of growing up are not as important, as the foundations have already been laid by the child's experience at a very early age.

In the 21<sup>st</sup> century television, computers, internet, mobiles, online games and use of AI (Artificial Intelligence) *etc.* are among the

many advances and they represent a mixed blessing for developing children and their parents. Artificial intelligence (AI) has become an integral part of children's lives within last one year. With the growing availability of Digital Media, adolescents are exposed to global information, often unsupervised due to working parents and personal gadgets. Unable to distinguish fact from fantasy, many adopt harmful behaviours such as tobacco or alcohol use, aggression, and unsafe sex.<sup>7</sup> The Digital Media industries are multibillion dollar industries and growing day by day. The electronics market in India, at US\$ 11.5 billion in 2004,<sup>10</sup> will be the fastest-growing electronics market worldwide over the next several years. This market was expected to grow at a Compound Annual Growth Rate (CAGR) of 23% by 2010 to reach US\$ 40 billion.<sup>35</sup> In 2014, expansion picked up pace, laying the foundation for bigger leaps.<sup>9</sup> By 2021, retail electronics surged to US\$ 73.3 billion, riding on post recovery demand.<sup>29</sup> In 2024, the industry exploded to US\$ 180 billion, powered by smartphones, TVs, and laptops,<sup>12</sup> and by 2025–26, turnover crossed US\$ 150 billion, with bold projections of US\$ 300 billion ahead.<sup>18</sup> Each milestone reflects not just numbers, but the energy of a nation stepping into the global electronics arena, yet there is little research substantiating the educational claims of many of these products. Parents take their decisions based on marketing assertions or advertisements, not third party research, and the little research that does exist about the effects of Digital Media on children's development, making it essential to examine how Digital Media truly impacts children's learning and development.

Digital Media is source of information

in our present day lives but this information can be right or wrong and also can contain good or bad content and we are free to see and choose which one is right and which one is wrong. But what about Children? They are in different developing stages, so can hardly differentiate between wrong and right or good and bad.

#### *Television and Child development :*

The most ubiquitous source of exposure to violence for children is Television. The average child of 2-5 years of age watches 1-2 hour of television a day which is increasing day by day. Many children are growing up in homes where the TV is an ever-present companion. Many children live in homes where the TV is left on at least half the time or more, even if no one is watching, and some live in homes where the TV is on always or most of the time. According to the study, children who have a TV in their bedroom or who live in heavy TV households spend significantly more time watching than other children do, and less time reading or playing outside. Background media (media not intended for children) could also impact infants and toddlers by distracting the child from play or other activities, by inhibiting the child's inner monologue, by enhancing attention to play or other activities or by hindering parent and child interactions. Television viewing in younger children has been shown to retard language development.<sup>7</sup> Research with older children has found that effects of foreground media (media intended for children) depend on the content (*e.g.* viewing aggressive television leads to aggressive behaviour and viewing educational content leads to positive educational outcomes). For infants and toddlers, foreground media may

displace other activities, have negative effects no matter what the content, or have positive or negative effects depending on the content.

Using China Family Panel Studies (CFPS) 2018 data from 934 Chinese children aged 4–7 years, a study examined the relationship between television viewing time and early learning and behavioural habits. The findings showed a significant negative association, indicating that greater TV viewing was linked to poorer learning and behavioural habits.<sup>14</sup>

Mittal M *et al.*,<sup>21</sup> reported that Indian children watched television for an average of 18.35 hours per week, and greater exposure to TV advertisements was linked to stronger behavioural effects on children. This study concludes that the more a child is exposed to television advertisement the greater he/she is affected.<sup>21</sup>

Approximately 3500 studies have examined the association between media violence and violent behaviour, all but 18 have shown a positive relationship. Although exposure to media violence cannot be equated to exposure to real life violence but many studies confirm that media violence desensitizes children to the meaning and impact of violent behaviour.

A study which was conducted in USA confirmed that in the case of destruction of world Trade Towers among children whose parents did not try to restrict television viewing, there was an association between the numbers of hours of television viewing and the numbers of reported stress symptoms.<sup>17</sup> Violence affects

children psychologically and behaviourally. It may influence how they view the world and their place in it. Children can come to see the world as a dangerous and unpredictable place. This fear may thwart their exploration of the environment, which is essential to learning in childhood. High exposure to Digital Media in children correlates with poorer performance in school, symptoms of anxiety and depression.

#### *Computer use and Child Development :*

Present century is the century of the information technologies and computers are the necessities of today. They are the part of our daily lives. To understand computers, a child is required to know how to use them and child is allowed to use the computer at an early age, so that he or she is able to develop his or her computer skills faster. But, in exposing children to computers in the home at an early age is right or wrong, this is a big question. From 2000 to 2005, computers were mostly limited to urban schools and cyber cafes,<sup>23</sup> while from 2006-2010, schools started to setup their computer labs but their use was limited outside the schools due to poor low household ownership<sup>22</sup>. Data from 2011 to 2015 shows that only 26.4% of schools had computers, many non-functional while household computer ownership still below 10% nationally.<sup>24</sup> Household penetration of computers remained low in 2017-18 reporting only 6% of rural households and approximately 23% of urban households owning a computer.<sup>20</sup> By 2025, less than 8% of children accessed the internet via desktops/laptops, with smartphones becoming the dominant device for digital learning.<sup>25</sup>

There is no doubt that computers play a major role in our lives. But there is no evidence

to show that computers can increase a child's intellect, however we also cannot say that they are harmful. Computers could be used as an aid at home to complement school education. But one cannot deny the role of school education in the development of child because no machine can replace the inspiration given by a teacher.

Some Doctors and Paediatricians advise that computers don't belong in early childhood and elementary school settings. Computers can damage the health as well as intellectual and social development of young children. Children need stronger bonds with their parents, yet use of excessive electronic gadgets are distracting children and adults from each other. It also argued that children learn through interactions and play, and by interacting with nature, but computers displace these normal learning experiences. Socialization and values are critical components of early education and it is very hard to imagine that the computer enhances these qualities. Even a young child can suffer from physical ailments such as neck pain and back pain, due to spending too much time on the computer on unbeneficial activities. A study of 2,632 Indian adolescents (13-19 years) found that while most were casual gamers (61.6%) and played less than one hour daily (60.9%), a significant proportion reported interference with daily life (26.3%) and emotional changes such as irritability and mood swings (58.4%). Longer gaming durations were strongly associated with academic disruption and emotional dysregulation, highlighting that excessive gaming poses measurable risks to child development.<sup>2</sup> Children who always play violent video games on their computers show significant increase in aggressive behaviour, aggressive cognition, aggressive affect and

physiological arousal with significant decreases in helping behaviour.<sup>7</sup>

#### *Internet use and Child Development :*

Children who use internet can interact with anyone in the world who is connected through the net without knowing him/her. Internet can now take the user all over the world anytime, anywhere. That means, lots of information in the form of texts, pictures, sounds, games and videos coming to life on the screen. In 2000-2005 Internet penetration was limited with slow speed and children's access was negligible.<sup>23</sup> Between 2005-2010, Broadband expansion increased access, but children's use remained restricted to schools and urban households.<sup>32</sup> By 2011–2014, internet users grew to approximately 250 million, and children began using it for education and entertainment.<sup>11</sup> Internet subscribers in India were about 342 million in March 2016, and rose to over 500 million by around 2018 and reduced data costs, lead to widespread adolescent use for social media, OTT and gaming.<sup>33</sup> By 2021–2024, India had approximately 924 million internet connections and children used it extensively for online learning during COVID 19, but digital addiction, cyberbullying and risky online behaviours also increased<sup>1</sup>. In 2025–2026, internet users reached 1.03 billion (approximately 70% penetration), while digital literacy improved, studies reported rising screen addiction, poor sleep, and emotional dysregulation among children.<sup>25</sup>

The internet makes possible activities such as shopping, mailing, reading books, listening to music *etc.* Even though this

technology is wonderful, one needs to be reminded that it is all still simulation. None of it is really real, even though the user may feel as if he/she is actually interacting with society or studying online, all they are in fact doing is sitting at a terminal in isolation. Internet user can interact with the world but don't know about his/her neighbours. This is a very disturbing thought in the social development of a child.

The Internet has many dangers. There are many inappropriate web sites which can pop-up even when child is not searching for them. In fact, the number of pornographic web pages increased to many folds in recent years. When children are exposed to pornography, it creates an unhealthy view of human sexuality. Pornography becomes a building block in a child's mental and emotional development. Early exposure to pornography (under the age of 14) is related to greater involvement in deviant sexual practices. In addition, some studies suggest that exposure to pornography can prompt kids to act out sexually against younger, smaller, more vulnerable children. Researchers reported that children and teenagers who are exposed to pornography, wanted to try out some of the behaviours they had viewed within a few days after exposure.

If young child is using the internet for large periods of time doing activities that are of little benefit to his or her education, this is in effect a waste of precious childhood. it can harm learning, sleep, social skills and emotional wellbeing, and may expose the child to unsafe or inappropriate content. Healthy internet use in children requires limits on time and close parental supervision.

*Mobile phone use and Child Development:*

Now a days mobile phones are common in use. In the early 2000s, mobile phones were rare among children and limited to urban middle class families, mostly as basic feature phones without internet access.<sup>31</sup> In India there has been 25-fold increase in mobile subscriber base in a span of just five years from 2000-01 to 2005-06. During the same period, mobile-density was increased more than 23-fold from 0.35 in 2000-01 to 8.12 in 2005-06. By 2006–2010, early smartphones entered the Indian market, but penetration among children remained minimal, with mobiles used mainly for calls and SMS.<sup>23</sup> Between 2011 and 2015, falling handset prices and cheaper data plans triggered the smartphone revolution, and children increasingly accessed mobiles for gaming and entertainment<sup>32</sup>. From 2016 to 2020, the launch of free internet data with voice call drastically reduced data costs, leading to explosive growth in mobile internet use among adolescents.<sup>11</sup> By 2024, 89% of rural adolescents aged 14–16 had smartphone access, with 57% using them for education and 76% for social media.<sup>1</sup> Finally, by 2025–2026, 85.5% of households owned smartphones, making mobiles the dominant device for children's digital access, while the Economic Survey 2026 identified digital addiction as a public health risk, with approximately 15% of adolescents showing moderate to severe symptoms.<sup>19</sup>

Mobile phone exposure among Indian children has increased rapidly over the past two decades. Early studies described mobiles as 'digital pacifiers' and reported that children aged 1–5 years spending 2–6 hours daily on

screens.<sup>30</sup> These patterns were linked to poor sleep, irritability, and developmental delays. Similarly, a systematic review of children aged below 5 years in India found pooled daily screen time of 2.22 hours, exceeding WHO recommendations of less than one hour per day. As a habit of using mobile phones in excess, there may be compromise in the duration of sleep resulting in dozing or day time sleeping.<sup>16</sup> Also, an increase in screentime leads to an increase in stress levels.<sup>6</sup> Excessive screen exposure is also associated with cognitive, social and psychomotor developmental risks, emphasizing the need for parental regulation.<sup>15</sup>

Some research studies worldwide are showing biological effects from low level, non-ionizing radiation similar to that used in wireless communications. Mobile phone radiation, specifically radiofrequency electromagnetic fields (RF EMF), has become a growing concern for child health in India. A cross sectional study of 241 children exposed to mobile towers found that higher Specific Absorption Rates (SAR) were strongly associated with elevated oxidative stress biomarkers, including Superoxide Dismutase and Glutathione Peroxidase, suggesting that chronic exposure may disrupt cellular balance.<sup>28</sup> Similarly, a longitudinal Indian study on children aged 0–5 years reported that prolonged exposure to cell tower radiation was linked to delays in gross and fine motor skills and increased sleep disorders.<sup>26</sup> So, if there are currently unrecognized adverse health effects from the use of mobile phones, children are at more risk because of their developing nervous system, the greater absorption of energy in the tissues of the head. Preliminary evidences showed that radiation penetrated deeper into the heads of teenagers

and children resulting in more exposure to potentially harmful radio waves than adults.

Moreover, the increase in the use of mobile phones in children can increase occurrence of various disorders, often misdiagnosed in patients as psychosomatic:

1. Headaches, migraines
2. Sleeplessness, daytime sleepiness
3. Tinnitus
4. Susceptibility to infection
5. Nervous and connective tissue pains
6. Anger issues
7. Irritation *etc.*

The German Academy of Paediatrics issued a statement, advising parents to restrict their children's use of mobile phones. They advised that all mobile phone users should keep conversations as brief as possible but that additional precautions are appropriate for children in view of 'special health risks' associated with their growing bodies. Australian government also recently made the policy for use of mobile phones. So on a precautionary basis, parents should tell their children to limit the use of wireless phones, and that when using an earpiece, pregnant women should keep the phone away from their bellies and teenagers and children should keep it away from their developing sex organs.

#### *Artificial Intelligence (AI) and Child Development :*

Artificial intelligence is increasingly entering children's lives through educational apps, smart toys, chatbots, adaptive learning platforms and voice assisted devices. It has become a significant boon for doctors to detect developmental disorders in children such as

autism, attention deficit hyperactivity disorder (ADHD) and dyslexia *etc.* Beyond diagnostics, AI also plays a crucial role in disease prediction and prognostication.<sup>13</sup> AI enabled educational platforms further support children by personalizing their learning experience and improving learning outcomes in early childhood. But the same time this can become a hurdle in child development due to reduced curious thinking which may weaken critical thinking abilities and expose them to inaccurate information. In childhood human interaction, emotional connection and guidance matter more than cyber world for healthy development.

#### *Role of Parental Control :*

Parental control plays an important role in guiding children's use of TV, computers, the internet, mobile phones, and AI-based devices. For Internet and AI tools in particular, parental involvement is important because children may trust machine generated answers too easily, so supervision, discussion, and digital literacy are needed alongside restrictions.<sup>34</sup> Parental control should therefore be seen not only as a safety measure but also as a way to support responsible, age-appropriate, and healthy digital development. But excessive parental guidance may limit self-reliance, decision-making, and problem-solving skills in children.

#### *Child Development from Ayurveda Aspect:*

In Ayurveda, Charaka Samhita, Ashtanga Sangraha, Ashtanga Hridaya and Kashyap Samhita discussed on child development in detail. Acharya Charaka has mentioned that child development is not limited to height and weight only but it also includes mental,

emotional, and social growth, supported by proper diet, routine, sleep, and care, which is thoroughly explained in Kaumarbhritya as samvardhana and samskara<sup>27</sup>. Considering the close interrelation between *Vridhhi* and *Bala*, Acharya Charaka, described *Sharira Vriddhikara Bhava*<sup>3</sup> and *Bala Vriddhikara Bhava*<sup>3</sup> and likewise presented *Brinhaniya Mahakashaya*<sup>4</sup> and *Balya Mahakashaya*<sup>4</sup> to signify their roles in promoting body growth and strength. Ashtanga Sangraha discussed prevention and treatment of diseases of children caused by external agents in Uttarasthana.<sup>8</sup>

Every child is unique and according to Ayurveda it is important to know the *Prakriti* and dominant *Dosha* of each child to understand their body, mind and behaviour. This will help parents to give better upbringing by providing individualised routine, care and emotional support. The same idea can also guide parenting in this digital age because different children may respond differently to screen time, online games and online learning. With the understanding of Ayurveda principles, parents can balance a healthy daily routine, emotional support, natural growth and screen time.

Children's engagement with Digital Media is increasing from 2000 to 2026. Each and every medium like television, computers, internet and mobile devices has played specific role in shaping developmental outcomes and

are mixed boons for children. Television was the dominant medium till 2010 with shared family and cultural experience but unrestricted viewing was associated with stress, anxiety and aggression. Use of computers introduced children to coding, research, and academic enrichment but increasingly overshadowed by mobile devices, reducing their relevance in everyday child development. Internet introduced online learning platforms, especially during the COVID 19 pandemic, ensured continuity of education to children. At the same time, the internet exposed children to cyberbullying, unsafe browsing and distraction. Mobiles phones become easily accessible till 2025 and children spending significant hours on social media, gaming and OTT platforms. While mobiles facilitated literacy apps and educational continuity, they also introduced unprecedented risks: addiction, aggression, sleep disruption, obesity. The recognition of digital addiction as a public health concern in India's Economic Survey 2026 highlights the urgency of addressing mobile overuse among children. Therefore, parental guidance and digital literacy is essential component to use it. With near universal mobile/internet use among 15–29-year-olds, access is no longer the binding constraint; the focus needs to shift to behavioural health considerations such as the rising problems of digital addiction, quality of content, wellbeing impacts, and digital hygiene.<sup>19</sup>

Table-1. Digital Media Exposure Among Children and Adolescents

| Period    | TV                                                                 | Computer                                | Internet                       | Mobile                                     |
|-----------|--------------------------------------------------------------------|-----------------------------------------|--------------------------------|--------------------------------------------|
| 2000–2005 | Dominant medium in homes; cartoons, serials, ads shaped behaviour. | Limited to urban schools & cyber cafés. | Early adoption, dial up access | Rare among children; basic feature phones. |
| 2006–     | Still primary                                                      | Growing in                              | User base                      | Early smartphones in                       |

(1987)

|               |                                                                  |                                                    |                                                        |                                                                                                                                                          |
|---------------|------------------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2010          | entertainment;<br>concerns about<br>advertising effects.         | schools; used<br>for structured<br>learning.       | increased;<br>broadband<br>expansion                   | urban middle class.                                                                                                                                      |
| 2011–<br>2015 | Declining influence<br>among youth; replaced<br>by digital media | Still important for<br>coding and labs             | Digital India<br>launched; rapid<br>expansion          | Smartphone<br>revolution begins;<br>economic data plans.                                                                                                 |
| 2016–<br>2020 | Secondary role; OTT<br>platforms rise.                           | Declining<br>relevance; laptops<br>in urban homes. | Approx 500M<br>users (2019);<br>social media<br>surge. | Explosive growth;<br>cheap/ free data<br>effect; majority of<br>teens online.                                                                            |
| 2021–<br>2024 | Family viewing<br>persists but less<br>central                   | Less than 10%<br>children use<br>desktops/laptops. | Internet<br>connections<br>surge (2024).               | Use of mobiles among<br>rural teens increased;<br>mixed use for<br>education, and social<br>media.                                                       |
| 2025–<br>2026 | Still present but<br>overshadowed<br>by mobiles                  | Marginal role in<br>child access.                  | 1.03B users<br>(2025); 70%<br>penetration.             | 85.5% households<br>own smartphones<br>(2025); Approx 15%<br>adolescents show<br>moderate to severe<br>tech addiction. Use of<br>Artificial intelligence |

Governments have adopted different policies on mobile phone use among school age children to balance educational benefits with risks of distraction and mental health concerns. Some countries like France, China, Brazil, Australia, and Italy have implemented national bans on students' use of mobile during school time. Others, such as Sweden, Finland, Spain, Germany, Canada, the UK, and the US, enforce partial bans or state/provincial restrictions, allowing limited use under supervision or for educational purposes. In contrast, nations including India, Portugal, Ireland, and Singapore rely on guidance based policies, leaving decisions to schools or states rather than imposing national laws.

So we can easily assess that Digital Media are mixed blessings to the human beings. We cannot ignore the use of Television, Computers, Internet, Mobile phones and Artificial Intelligence (AI) in our life but excessive use will certainly affect the mental, physical and social development of a child. Perhaps the most sobering consequence is that over exposure of Digital Media to the children may change the way that children view their future. They can use alcohol, drugs, misbehave with their parents and teachers. These children are at more risk for psychogenic, social, academic, and physical problems. So parents and teachers should take a balanced approach by restricting use of their child's television,

computer, internet and cell phone use. The common recommendations for using Digital Media are as follows :

1. Understand each child's *prakriti* and dominant *dosha* before planning routine, care and screen time because Ayurveda emphasizes individuality.
2. Limit the use of Television, Computers, internet and Cell phones.
3. Don't make the Television/ mobile the focal point of house.
4. Digital Media should be out of children's bedroom.
5. Lock the adult channels/ websites so that children cannot see sexually explicit materials.
6. Always use filter software in the computer when children surf internet.
7. Find out what sites your child likes to visit online, and discuss about these sites.
8. Look for safe site lists that can be trusted.
9. Discourage the use of violent video games.
10. Do not forget that emotional support and human touch are more important than the cyber world in childhood.

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