Toys for infants and toddlers: An analytical study

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Abstract

Introduction: Play is essential for child development as it contributes to their cognitive, physical, social, and emotional well-being. Toys are the primary medium of engagement of caregivers with their children. Traditionally, physical toys were provided to the children. With the introduction of digital toys and screen-based devices, the challenge has been to recognize their effect.

Objectives: To assess the practice of toys in infants and toddlers, determine associated health risks and determine the appropriateness of toys as per age.

Results: With traditional toys, 74% played with dolls, 72% with soft toys and 5% with outdoor equipment; 53% spent <1 hour, 31% 1-2 hours and 15% >2 hours playing with traditional toys. With digital toys, 61% parents owned 1-3 digital devices, 23.1% 4-6 devices and 15% >6 devices. Almost 92% of children were exposed to mobile screen, 47% to television screen and 42% to tablet. In 77% cases, parents were the principal interactor with child and 15% were solitary play oriented.

Conclusions: Almost 50% of traditional toys were not age appropriate. Regarding digital toys, screen time was not safe in 100% in <2-year-old and only 31% safe in 2–3-year age group.

(Key words: Toys, Traditional toys, Toy safety, Playtime, Digital devices, Screentime)

Introduction

Play is essential for child development as it contributes to their cognitive, physical, social, and emotional well-being[1]. Toys are the primary medium of engagement of caregivers with their children. Play increases in complexity and imagination, from simple imitation of common experiences, such as shopping and putting baby on bed (at 2-3 years age), to more extended scenarios involving singular events, such as going to the zoo or going on a trip (3- or 4-years age). Traditionally, physical toys have been provided to the children. With the introduction of digital toys and screen-based devices, the challenge has been to recognize their effect. Hokosawa R, *et al*[2] found routine and frequent use of mobile devices to be associated with behavioural problems in childhood.

Objectives

To assess the practice of toys in infants and toddlers, determine associated health risks and determine the appropriateness of toys as per age.

Method

A cross-sectional analytical study was conducted in Veer Surendra Sai Institute of Medical Science and Research, Burla, Sambalpur, Odisha, India on infants and toddlers attending the paediatric out-patient department (OPD) with minor complaints, immunization clinic, in-patient department (IPD), nutrition rehabilitation centre (NRC), and staffs of paediatric department. The period of study was from April 2021 to October 2022. Study population comprised parents of children aged 0–3 years attending paediatric OPD, IPD, NRC and immunization clinic who were enrolled along with the staff members of our hospital. Exclusion criteria were children with special needs e.g., cerebral palsy, autistic disorders, attention deficit hyperactivity disorder (ADHD), congenital abnormalities and critically ill children. Those cases where claims and reports of the interviewee could not be verified digitally or physically were also excluded.

Cases were selected from among the patients and patients' relatives visiting the IPD and OPD of the paediatric department of this hospital, along with that from the immunization clinic [social and preventive medicine (SPM) OPD], 1 patient per day from one unit, maximum 5 cases per week and a weekly visit to the immunization clinic. This accounts for the sample size of 480 cases over the 20-month study period. Days of the week were assigned to each unit and the immunization clinic and visits were made accordingly. In a family with multiple children in the age group of 0 - 3 years, only the index case was considered.

Ethical issues: Approval for the study was given by the Institutional Research and Ethics Committee of Veer Surendra Sai Institute of Medical Sciences and Research (No, 103-2022/IST/91/Dt) on 17.05.2022. Written informed consent was taken from parents of the child, preferably the mother.

A predesigned questionnaire was filled in the language that was comfortable to the parents (English/Odia/Hindi). Patients were divided into three age groups, 0–1-year, 1-2 years and 2-3 years; 160 questionnaires were collected from each age group. After collecting all 480 questionnaires, the data were tabulated in Microsoft Excel.

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Results

Traditional toys included balls, cubes, puzzles, toy cars, dolls, stuffed toys, art and craft material and outdoor objects. Digital toys included smart phone, television, laptop/tablet and voice interactive device. For traditional toys, balls and cubes were found to be useful in 100% of the study population. Stuffed toys, dolls, puzzles, art and craft material were not useful in 11.7% (56), 5.4% (26), 2.2% (11) and 1% (5) respectively (Table 1, Figure 1).

Table 1: ***Traditional toys in infants and toddlers***

Traditional toys	0-1 year *(n=160)* n (%)	1-2 year *(n=160)* n (%)	2-3 year *(n=160)* n (%)	Mean %
Balls (>44mm diameter)	53 (33.1)	105 (65.6)	160 (100.0)	66.3
Cubes Soft Hard/ Wooden	 25 (15.6) 36 (22.5)	 48 (30.0) 40 (25.0)	 26 (16.3) 75 (46.8)	52.1
Outdoor equipment (tunnels for crawling, low climbing instruments, swings, etc.)	02 (01.3)	07 (04.4)	21 (13.1)	6.3
Puzzles: 2-3 piece 4-5 piece 6-12 piece	 11 (06.8)	 29 (18.1) 31 (19.3) 27 (16.8)	 47 (29.3) 33 (20.6) 29 (18.1)	45.2
Toys on wheels (Cars/Animals)	56 (35.0)	111 (69.3)	126 (78.7)	61
Dolls	71 (44.4)	140 (87.5)	135 (84.4)	72.1
Stuffed toys	55 (34.4)	125 (78.1)	155 (96.8)	69.8
Art and craft material	05 (03.1)	45 (28.1)	70 (43.7)	25

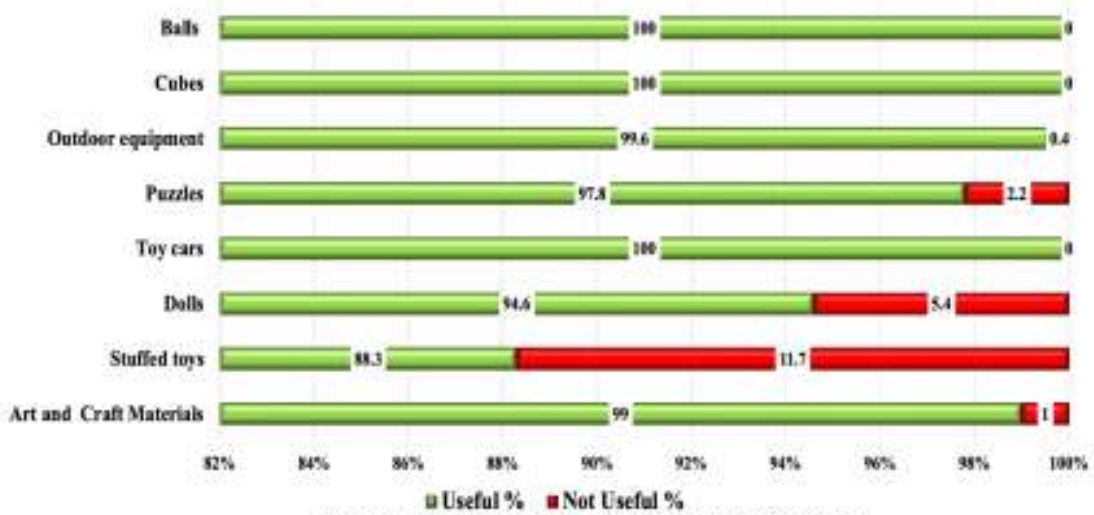

Figure 1: ***Useful traditional toys in infants and toddlers***

As for digital toys 88.4% (424) of the study population was found to be unsuitable; 39.4% (189) and 39.7% (191) were unsuitable for tablet/laptop and television respectively. Voice interactive device was found to be unsuitable for 4.2% (20). Screen time was found unsuitable for 100% of study population in 0-2 years age group (Table 2, Figure 2).

Table 2: ***Screen time in infants and toddlers***

Screen time	0-1 year	1-2 years	2-3 years
<30 min	45 (28.1)	44 (27.5)	35 (21.8)
30-60 min	73 (45.6)	62 (38.7)	67 (41.8)
>60 min	42 (26.2)	54 (33.7)	58 (36.5)

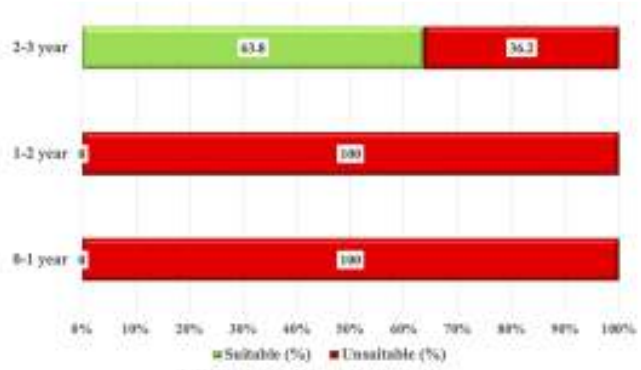

Figure 2: *Screen time vs Safety limit for age*

In the 0–1 year age group, 112 (70%) infants interacted with their parents, 27 (16.9%) liked solitary play, 10 (6.3%) played most with caregivers, 3 (1.9%) played with their peers and 8 (5%) with their pets. In the 1–2-year age group, 102 (63.8%) toddlers engaged with parents, 37 (23.1%) played solitarily, 6 (3.8%) played with caregivers, 10 (6.3%) played with their peers and 5 (3.1%) played with their pets the most. In the 2–3-year age group, 93 (58.1%) toddlers played with their parents, 19 (11.8%) had solitary play, 16 (1%) played with their caregivers, 20 (12.5%) played with their peers and 12 (7.5%) played with their pets (Figure 3).

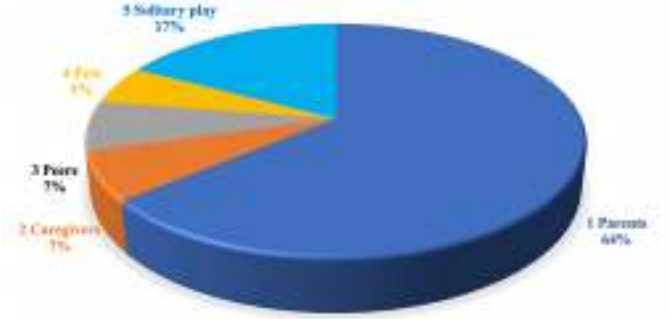

Figure 3: *Primary play companion in infants and toddlers*

A sociodemographic correlation was established in the study population and the safety of the toys. Sociodemographic determinants considered in this study were: age of the child, age of the parents, gender of the child, working parents, residence (urban/rural), type of family (nuclear/joint), number of siblings, socioeconomic status (SES), number of toys, cost of toys and education of parents (Table 3). Five safety aspects of toys were taken into consideration: materials, margin, weight, size and screentime of digital toys.

Table 3: ***Sociodemographic parameters (n=480)***

Parameter	Category	n (%)
Age (years)	20 – <30	255 (53.0)
	30 – 40	202 (42.0)
	>40	23 (05.0)
Respondent parents	Father	154 (32.0)
	Mother	326 (68.0)
Socioeconomic status	I – Upper	26 (05.4)
	II – Upper Middle	52 (10.8)
	III – Lower Middle	171 (35.6)
	IV – Upper Lower	175 (36.4)
	V – Lower	56 (11.8)
Occupation	Working	188 (39.0)
	Homemaker	292 (61.0)
Education of respondent parents	Illiterate	77 (16.0)
	Undergraduate	96 (20.0)
	Graduate	259 (54.0)
	Postgraduate	48 (10.0)
Siblings	0	106 (22.0)
	1	197 (41.0)
	2	101 (21.0)
	>2	76 (16.0)
Type of family	Joint	217 (45.0)
	Nuclear	263 (55.0)
Habitat	Rural	307 (64.0)
	Urban	173 (36.0)

Significant associations with each aspect of a toy: Material safety – unsafe in working parents (Table 4), edge safety – safer in older children (Table 5), weight of the toy – safer in older children, safer in higher SES, safer with children playing with a smaller number of toys, safer with cheaper toys, safer with children of younger parents (Table 6), size – safer in older children, safer in higher SES, safer with children playing with a smaller number of toys, safer with cheaper toys, safer with children of younger parents (Table 7), screentime of the digital toys – safer in older children, safer in lower SES, safer with costlier devices (Table 8).

Table 4: ***Sociodemographic association with material safety***

Factors	χ^2	Odds Ratio	p - value	Significance	Association
Age of child	3.5297	1.0202	0.0608	Insignificant	Positive
Gender of child	0.1170	1.0774	0.7319	Insignificant	Female>Male
Working parent	3.9726	0.6550	0.0462	Significant	Negative
Residence	0.0756	0.9433	0.7834	Insignificant	Rural>Urban
Type of family	0.1043	0.9360	0.7467	Insignificant	Joint>Nuclear
No. of siblings	0.0410	1.0211	0.8394	Insignificant	Positive
Socioeconomic Status	0.0904	0.9701	0.7637	Insignificant	Lower SES > higher SES
No. of Toys	3.1001	0.7332	0.0783	Insignificant	Negative
Cost of toys	0.0352	0.9706	0.8512	Insignificant	Negative
Educational qualification of parents	0.3957	1.0764	0.5293	Insignificant	Positive
Age of the parents	0.8285	0.8529	0.3654	Insignificant	Negative

Table 5: ***Sociodemographic association with edge safety***

Factors	χ^2	Odds Ratio	p - value	Significance	Association
Age of child	20.4417	0.9569	0.0001	Significant	Negative
Gender of child	0.9647	1.2140	0.3269	Insignificant	Male > Female
Working parent	0.6939	0.8554	0.4048	Insignificant	Negative
Residence	0.0044	0.9874	0.9471	Insignificant	Rural>Urban
Type of family	1.7016	0.7866	0.1924	Insignificant	Nuclear>Joint
No. of siblings	0.0951	0.9717	0.7578	Insignificant	Negative
Socioeconomic Status	1.0831	1.0996	0.2986	Insignificant	Higher SES > Lower SES
No. of Toys	1.7464	0.8210	0.1863	Insignificant	Negative
Cost of toys	0.0097	0.9860	0.9214	Insignificant	Negative
Educational qualification of parents	0.2736	1.0563	0.6009	Insignificant	Positive
Age of the parents	0.4253	1.1071	0.5148	Insignificant	Positive

Table 6: ***Sociodemographic association with weight of the toy***

Factors	χ^2	Odds Ratio	p - value	Significance	Association
Age of child	4.3104	1.0201	0.0386	Significant	Positive
Gender of child	0.0207	1.0287	0.8856	Insignificant	Female>Male
Working parent	2.4916	1.3442	0.1151	Insignificant	Positive
Residence	0.3383	1.1170	0.5609	Insignificant	Urban>Rural
Type of family	2.5450	1.3406	0.1112	Insignificant	Joint>Nuclear
No. of siblings	2.8746	1.1708	0.0911	Insignificant	Positive
Socioeconomic Status	5.1924	1.2321	0.0227	Significant	Higher SES > Lower SES
No. of Toys	10.1510	0.6150	0.6150	Significant	Negative
Cost of toys	4.5420	0.7365	0.0341	Significant	Negative
Educational qualification of parents	0.1200	0.9645	0.7291	Insignificant	Negative
Age of the parents	5.4973	0.6932	0.0198	Significant	Negative

Table 7: ***Sociodemographic association with size of the toy***

Factors	χ^2	Odds Ratio	p - value	Significance	Association
Age of child	4.3104	1.0201	0.0386	Significant	Positive
Gender of child	0.0207	1.0287	0.8856	Insignificant	Female>Male
Working parent	2.4916	1.3442	0.1151	Insignificant	Positive
Residence	0.3383	1.1170	0.5609	Insignificant	Urban>Rural
Type of family	2.5450	1.3406	0.1112	Insignificant	Joint>Nuclear
No. of siblings	2.8746	1.1708	0.0911	Insignificant	Positive
Socioeconomic status	5.1924	1.2321	0.0227	Significant	Higher SES > Lower SES
No. of Toys	10.1510	0.6150	0.6150	Significant	Negative
Cost of toys	4.5420	0.7365	0.0341	Significant	Negative
Educational qualification of parents	0.1200	0.9645	0.7291	Insignificant	Negative
Age of the parents	5.4973	0.6932	0.0198	Significant	Negative

Table 8: ***Sociodemographic association with screentime of digital toys***

Factors	χ^2	Odds Ratio	p - value	Significance	Association
Age of child	59.5653	1.2062	<0.0001	Significant	Positive
Gender of child	1.1677	1.4831	0.2735	Insignificant	Female>Male
Working parent	0.6690	1.3366	0.4111	Insignificant	Positive
Residence	0.9444	0.6920	0.3413	Insignificant	Rural>Urban
Type of family	1.8570	0.6108	0.1811	Insignificant	Joint>Nuclear
No. of siblings	0.0519	1.0413	0.8195	Insignificant	Positive
Socioeconomic Status	10.8203	0.5775	0.0013	Significant	Lower SES > Higher SES
No. of Toys	0.0525	0.9351	0.8207	Insignificant	Negative
Cost of toys	3.8547	1.7118	0.0496	Significant	Positive
Educational qualification of parents	0.9264	1.2200	0.3435	Insignificant	Positive
Age of the parents	2.0717	1.5134	0.1445	Insignificant	Positive

For traditional toys overall (satisfying all 4 physical criteria of safety) safety of toys in 0-1-year age group, 1-2-year age group and 2-3-year age group was 1.3% (2), 3.8% (6) and 7.5% (12) respectively. Toys that were both safe and useful toys in 0–1-year age group, 1–2-year age group and 2–3-year age group were 0.7% (1), 3.8% (6) and 7.5% (12) respectively (Table 9).

Table 9: ***Safety profile of toys***

Toy profile	0-1 years *(n=160)* n (%)	1-2 years *(n=160)* n (%)	2 -3 years *(n=160)* n (%)
Overall safe toys (satisfying all 4 criteria)	02 (01.3)	06 (03.8]	12 (07.5)
Both safe and useful	01 (0.7)	06 (03.8]	12 (07.5)

Discussion

The safety and suitability of a toy, as evident from the data presented, was dependent upon many factors. We tried to establish in this study the toys which were safe, useful in terms of the development of the child and which were both safe and useful. This was to be related with the sociodemographic factors ranging from education of the parents to the type of family the child belonged to. In terms of digital toys, we established safety in terms of screen time, referring to the IAP guidelines of 2022[3].

Four physical factors were taken into consideration for assessing the safety of the toys and these were put up against the socio-demographic profile of each patient to find out the association between them. We found that the material of the toy was safer as the age of the child increased, females were using toys which had safer materials, a joint family in rural area was more likely to use a safer material toy, more the number of siblings - safer was the material used, lower SES was more likely to use a safer material, as the cost and number of toys increased, the material safety decreased. Younger and more educated parents seem to choose a safer material for their child. However, all of the above associations were found to be insignificant. The only significant association found was in case of a working parent, where the safety of the material reduced.

The edge/margin of the toy was safer for males more than female, non-working parents, in rural and nuclear families. More the number of siblings, less safe was the edge of a toy and higher SES had safer edged toys. As the number and cost of toys increased the toy safety decreased. Older and more educated parents gave safer edged toys to their child. However, all of the above associations were insignificant. Only significant association of edge of a toy was with the age of the child, as the age increased the safety decreased.

Weight of the toy was considered safe if the child was able to lift it easily and when tossed it on himself or peers, it would not cause any injury or suffocation of any type. Females were found to have been playing with toys which were safe in terms of weight, and working parents provided their children with safer toys in this aspect. Children residing in urban areas and in joint families played with appropriate weight toys. More the number of siblings, safer were the toys in terms of weight. Surprisingly, more educated parents provided their children with heavier toys. However, none of the above factors were significantly associated. The significant associations were with age of the child – as the age increased, weight of the toys was safer; higher SES children played with safe weighted toys; as the number of toys and cost of toys increased – they were more unsafe in terms of weight; and the weight of the toys were unsafe as the age of the parents increased.

Size of a toy was assessed to be safe if it was not small enough to be ingested or to be inhaled as a foreign body; or large enough to cause any kind of injury or suffocation to self and peers. It was found that females were playing with a safer toy in terms of size; working parents provided their children with a safe sized toy; children residing in urban areas and in joint families played with safely sized toys. As the number of siblings increased, the children played with safe toys in this aspect and more educated parents exposed their children to toys that were unsafe in terms of their size. However, none of the above associations were found to be significant. Significant associations included, age of the child – more the age of the child, safer were the toys in this aspect; safe sized toys were seen in higher SES, a greater number of toys and increasing cost of the toys; and as the age of the parents increased, they provided their children with a more safely sized toy.

For the digital toys, the safety was assessed in measures of screen time in reference to the IAP guidelines 2022[3]. Females were exposed to lesser screen time, children of the working parents were exposed to lesser screen time probably because they carry their digital devices to their workplace; children residing in rural areas and living in joint families were exposed to lesser screen time, probably

due to lesser number of devices in rural population in comparison to urban population and in joint families, children tended to spend more time with their peers and other family members; as the number of traditional toys increased the screen time reduced and as the number of siblings increased, the screen time was in a safer range; and as the age and education of the parents increased the children were exposed to lesser screen time. However, none of the above factors were found to be significant. Significant associations were with – age of the child, older children in this age group were safer in terms of screen time; children living in lower SES were less exposed to digital screens and as the cost of the traditional toys increased the screen time reduced.

Toys for infants and toddlers: An analytical study is the first of its kind in India. Studies relating appropriateness of toys with gender preference[4,5,6], parental guidance[7], mouthing behaviour of toys[8] and skin conditions[9] arising from material of the toy have been done in other countries. In our study, we have tried to find associations and relationships of safety of the traditional toys and digital toys with respect to the sociodemographic factors; and also, the safety of digital toys in terms of exposed screen time. This study will be helpful for further similar studies to enumerate the factors affecting toy use in children. There needs to be proper guidelines and market regulations of the toys that are available for children. In this era of digitalization, children will be invariably exposed to some kind of screen devices. The current lifestyle of parents compels them to use digital devices as a mode for emotional pacifier and distraction, which is inappropriate for their social, motor and cognitive development. Although guidelines have been issued by the WHO and IAP regarding the use of digital devices and social media, it needs to be promoted and endorsed by the Government of India. This study will serve as a reference for academicians, paediatricians, lawmakers and also toy makers, so that a useful and suitable toy can be made available to each age group.

Conclusions

Almost 50% of the traditional toys were not age appropriate. In case of digital toys, screen time was not safe in 100% in <2 years old and only 31% safe in 2–3-year age group.

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