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BEHAVIOR AND SCHOOL REINSERTION OF ACUTE LYMPHOID LEUKEMIA SURVIVORS

COMPORTAMENTO E REINSERÇÃO ESCOLAR DE SOBREVIVENTES DE LEUCEMIA LINFOIDE AGUDA

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ABSTRACT: The acute lymphoid leukemia is the most common type of cancer in children. Evidence suggests the presence of adverse effects of the disease and treatment for cognitive, behavioral, and learning domains among survivors, although the etiology of these changes is not fully understood. Given this, it became relevant to investigate the behavioral profiles and school reintegration of 36 children aged 7 to 13 years. These were divided into two groups, one of survivors of acute lymphoid leukemia and the other of healthy children and adolescents. Behavioral and reintegration profiles were assessed using the Child Behavior Checklist and the Deasy-Spinetta Behavioral Questionnaire. The data of the instruments were analyzed using descriptive and inferential statistics. It was recorded a high prevalence of internalized complaints and learning disabilities, especially among girls and those diagnosed above five years. The results highlight the need for monitoring of surviving children, promoting interventions that ensure their development.

Keywords: Neuropsychology, Pediatric oncology, Acute lymphoid leukemia, Behavior

RESUMO: A Leucemia Linfoide Aguda é o tipo mais comum de câncer na faixa pediátrica. Evidências sugerem a presença de efeitos adversos da doença e do tratamento para os domínios cognitivo, comportamental e de aprendizagem entre os sobreviventes, embora a etiologia dessas alterações não seja completamente compreendida. Diante disso, tornou-se relevante investigar os perfis de comportamento e reinserção escolar de 36 crianças com idades entre sete e 13 anos. Estas foram divididas em dois grupos, sendo um de sobreviventes de Leucemia Linfoide Aguda e outro de crianças e adolescentes saudáveis. Os perfis de comportamento e de reinserção escolar foram avaliados através do Child Behavior Checklist e do Questionário Comportamental Deasy-Spinetta, aplicados aos pais e professores. Realizou-se análise dos dados através de estatística descritiva e inferencial. Constatou-se alta prevalência de queixas internalizantes, além de dificuldades de aprendizagem no grupo de sobreviventes, notadamente entre as meninas e aqueles que tiveram o diagnóstico em idade superior a cinco anos. Os resultados ressaltam a necessidade de monitoramento das crianças sobreviventes, promovendo intervenções que auxiliem no seu desenvolvimento.

Palavras-Chave: Neuropsicologia; Oncologia pediátrica; Leucemia linfoide aguda; Comportamento

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Official indicators from the Instituto Nacional do Câncer estimate the number of new cases of pediatric tumors close to 12,500 in the 2018-2019 biennium, representing 3% of total cancer diagnoses in the country. In this context, the Southeast and Northeast regions stand out as those in which the highest number of new diagnoses is expected (5,300 and 2,900 cases, respectively). Among the new cancer cases predicted for 2019, leukemias represent the most frequent malignant disease in the juvenile population; about 25% to 35% of cases occur between the ages of 0 and 4 years (INCA, 2018).

Although the Brazilian scenario may seem adverse, it is noteworthy that at the end of the last century, especially in the last decade, ALL has become one of the most understood and curable diseases in the world. This, in turn, entails a better understanding of how both cancer and its treatment – even when comprised solely of chemotherapy - affect cognitive, behavioral, and learning domains among survivors (An & Lee, 2019).

In addition to cognitive impacts, the literature has shown concern about the high prevalence of behavioral and school reintegration problems among ALL survivors (Mertens et al., 2014). However, such studies commonly use more comprehensive measures which, while capable of identifying broad problems, may not be specific enough to investigate the biological and social mechanisms that contribute to the emergence of late-onset effects in the aforementioned domains (Plas et al., 2018). The importance of more specific measures derives from the understanding of how important neurodevelopmental factors are for the emergence of post-treatment damages, as well as of the repercussion of the disease itself on the social life of children (Dietrich & Parsons, 2017).

Parents and teachers report the presence of significant behavioral problems in surviving children and adolescents (Liu et al., 2018; Sharkey et al., 2019). Behavioral problems are those that include internalization and externalization factors - the first being related to isolation behaviors, somatic complaints, anxiety and depression, and the second to aggressive behavior and rule breaking (Achenbach, 1991).

Children and adolescents who are survivors of ALL also have school difficulties in mathematical, reading, and writing (Richard et al., 2018). Such difficulties are associated with the impacts of treatment on the cognitive functioning of individuals in functions such as visual attention and visuomotor skills (Richard et al., 2018). Moreover, in school, these children experience social relationship problems, especially in friendships. These difficulties are commonly separated into five categories, among which are “feelings of alienation from friends”, “feeling different compared to others” and “difficulty studying” (An & Lee, 2019).

Despite the acknowledgement of the aforementioned difficulties, no consensus has been reached regarding the nature and etiology of the academic and behavioral difficulties, considering the Brazilian specificities. It is important to recall that a child’s brain undergoes constant changes, with intense transformations at structural-anatomical, physiological and neurochemical levels (Gomes et al., 2017). As a result, the clinical expressions of infantile symptoms are very distinct and, therefore, it is suggested that cognitive and behavioral changes constitute a result of the dynamic interaction of multiple factors.

Given the above, it is important to characterize the behavioral and school reintegration profiles of Brazilian children and adolescents who are survivors of ALL, so as to offer this clinical group effective intervention modalities that promote development, learning and quality of life.

METHOD

Thirty-six children and adolescents aged from seven to 13 years participated in this research. This age group was chosen for its higher probability of ALL development and diagnosis. These

participants were subdivided into two groups: G1 and G2. G1 is composed by 18 children and adolescents who: survived ALL, underwent chemotherapy exclusively (systemic and intrathecal), are students in Rio Grande do Norte state (in either public or private schools), and have a mean age of 9,7 years. Out of the 18 children and adolescents, seven are female and eleven are male. G2 is composed by 18 healthy children and adolescents, matched to G1 by sex, age, and school system.

Instruments

Child Behavior Checklist (CBCL): The CBCL questionnaire has been designed for parents in order to investigate behavioral, emotional, and adaptive functioning problems in children aged 6 to 18 years. It consists of 138 items, divided into two scales: Social Competence Scale (20 items) and Behavioral Problems Scale (118 items). The latter is subdivided into two scales: Internalizing Behavior Problems Scale (subdivided in anxiety/depression, withdrawal/depression, somatic complaints) and Externalizing Behavior Problems Scale (subdivided in rule-breaking behavior and aggressive behavior) (Achenbach, 1991).

Deasy-Spinetta Behavioral Questionnaire (DSBQ): This questionnaire is intended for teachers and aims at investigating the process of school reintegration of children and adolescents surviving ALL. It consists of 38 dichotomous questions (affirmative or negative) and investigates three major domains: learning, socialization, and emotional aspects (Gomes et al., 2017).

Data Collection Procedure

The selection of children and adolescents who survived ALL was carried out by consulting the records of the pediatric sectors of two public healthcare facilities that are local references in the treatment of childhood cancer. Initially, 63 individuals who met the criteria were identified, but this number was reduced to 18 due to factors such as death, hospital records not being kept up to date, patients who live far from the capital (location of hospitals) only sporadically visiting it, presence of other diseases, patients or family members not interested in participating in the research, and recurrences during evaluation period.

After the parents signed the Informed Consent Form, they were asked to individually answer the CBCL in approximately 30 minutes. Later, in school visits, teachers were also asked for consent, plus DSBQ completion. The teachers were chosen based on the length of time they had been in contact with the patients, at least one semester being required. It is noteworthy that for the control group only the CBCL was used, since the DSBQ was developed exclusively for teachers of ALL survivors, and therefore consists of specific questions that are not applicable to the typical learning process.

Data Analysis Procedure

CBCL data were computed using the Assessment Data Manager (ADM) software. In the analysis of the results, there was a separation of behavior frequency into three nominal classification ranges: Borderline, Clinical and Normal. However, given that the objective of the present study is the detection of behavioral differences when compared to normative data and to the control group (not the diagnosis of clinical conditions), the Borderline and Clinical categories were grouped, which leaves two rating ranges: Normal and Altered. This methodological approach is supported by the guidelines contained in the questionnaire manual, which states that, since the objective is dichotomizing the performance between normal and altered, the Borderline and Clinical classifications can be grouped (Achenbach, 1991). The results from the DSBQ were obtained from

the answers attributed to each of the 38 questions, as well as from the grouping of these into the three domains that make up the instrument: learning, socialization and emotional aspects.

Initially, descriptive statistical analysis provided the CBCL and DSBQ results frequencies, which were classified as normal or altered. Then, in order to compare the results obtained by the two groups at the CBCL, Pearson's Chi-square test was performed. This is a statistical test applied to categorical data which adopts the value p <0.05 as the rejection parameter of the null hypothesis. In addition, Pearson's chi-square test was also applied to assess whether there was a statistically significant difference between the answers provided by parents and teachers for two of the domains assessed by the instruments: Learning and Behavior.

RESULTS

Child Behavior Checklist (CBCL)

Among the four CBCL scales that measure Social Competence, the highest percentage of normal classification for both groups was identified in the Activity Competence Scale, Social Interaction Scale and School Activity Scale. However, in the Total Competence scale, a higher percentage of changes in G1 was identified, as described in Table 1.

Table 1. Percentage Distribution of Results obtained by G1 and G2 on the Social Competence Scale - CBCL

Social Competence Scale		**G1**	**G2**
Activity Competence	Normal	61.1%	88.9%
	Altered	38.9%	11.1%
Social Interaction	Normal	83.3%	88.9%
	Altered	16.7%	11.1%
School Activity	Normal	66.7%	100.0%
	Altered	33.3%	----
Total Competence	Normal	22.2%	83.7%
	Altered	77.8%	16.7%

Table 2. Percentage Distribution of Results obtained by G1 and G2 in the Behavioral Problems Scale - CBCL

Behavioral Problems Scale		G1	G2
Internalizing Problems	Normal	44.4%	72.2%
	Altered	55.6%	27.8%
Externalizing Problems	Normal	61.1%	100.0%
	Altered	38.9%	----
Total Problems	Normal	50.0%	94.4%
	Altered	50.0%	5.6%

In the Behavioral Problems Scale, G1 had a high prevalence of internalizing problems, as well as G2, making it relevant to emphasize the percentage of changes presented by G2 participants, given that there is a higher frequency of changes regarding these problems, which will be discussed later. However, a pattern contrary to this was identified in the Externalizing Problems Scale, with higher

percentages of normality being identified in both groups, although there is a difference between them, with G1 showing a higher percentage of change when compared to G2. In the Total Problems Scale, the performances of the groups differ, with G1 presenting a higher frequency of altered results, as shown in Table 2.

As for the distribution of behavioral syndromes, data is shown in Table 3.

Table 3. Percentage Distribution of Results obtained by G1 and G2 in the Behavioral Syndromes Scale – CBCL test

Behavioral Syndromes Scale		**G1**	**G2**
Anxiety/Depression	Normal	61.1%	72.2%
	Altered	38.9%	27.8%
Emotional Reactivity	Normal	77.8%	94.4%
	Altered	22.2%	5.6%
Somatic Complaints	Normal	83.3%	94.4%
	Altered	16.7%	5.6%
Social Problems	Normal	77.8%	100.0%
	Altered	22.2%	----
Thought Problems	Normal	66.7%	94.4%
	Altered	33.3%	5.6%
Attention Problems	Normal	72.2%	94.4%
	Altered	27.8%	5.6%
Rule-breaking Behavior	Normal	66.7%	100.0%
	Altered	33.3%	----
Aggressive Behavior	Normal	50.0%	94.4%
	Altered	50.0%	5.6%

Deasy-Spinetta Behavioral Questionnaire (DSBQ)

As for the three DSBQ domains aimed at assessing school reintegration of ALL survivors, it was found that the emotional dimension is the one in which the highest percentages of changes are concentrated. Data regarding frequency and percentages obtained in the three domains can be found in Table 4.

Comparison between groups - CBCL

Regarding the comparison of both groups' CBCL data, statistically significant differences were found in the Behavioral Problems and Social Competence scales. The ALL survivors group (G1) presented greater difficulties in specific domains, as shown in Table 5.

Comparison between CBCL and DSBQ answers of parents and teachers of ALL students

Research into possible differences in parent and teacher positioning regarding learning and behavioral dimensions indicates that there is a high level of agreement on behavioral aspects. This agreement was verified by cross-checking the CBCL Behavior Problems Scale data and the DSBQ Emotional Aspects Domain data - both with content associated with behavioral aspects – and concluding that there is no statistically significant difference in any of the variables that make up these domains.

Table 4. Frequency Distributions and Percentage of DSBQ Results

		Frequency	Percentage
Learning Domain			
Is at the same level as peers?	Normal	12	66.7%
	Altered	6	33.3%
Finishes assigned schoolwork?	Normal	14	77.8%
	Altered	4	22.2%
Is able to concentrate?	Normal	15	83.3%
	Altered	3	16.7%
Has learning difficulties?	Normal	10	55.6%
	Altered	8	44.4%
Has difficulty staying in a task?	Normal	12	66.7%
	Altered	6	33.3%
Has difficulty following verbal instructions?	Normal	13	72.2%
	Altered	5	27.8%
Can't stay quiet, is agitated or hyperactive?	Normal	12	66.7%
	Altered	6	33.3%
Has memory or task managing issues?	Normal	8	44.4%
	Altered	10	55.6%
Has specific reading difficulties?	Normal	10	55.6%
	Altered	8	44.4%
Has specific math difficulties?	Normal	10	55.6%
	Altered	8	44.4%
Has difficulty in tasks that require logical skills?	Normal	9	50.0%
	Altered	9	50.0%
Emotional Aspects Domain			
Goes to school without complaining?	Normal	15	83.3%
	Altered	3	16.7%
Is aprehensive towards school?	Normal	14	77.8%
	Altered	4	22.2%
Spends time alone, looks sad?	Normal	17	94.4%
	Altered	1	5.6%
Not particularly active, has slow movements or is lacking in energy?	Normal	12	66.7%
	Altered	6	33.3%
Easily hurt, is prone to accidents?	Normal	18	100.0%
	Altered	0	----
Cries, moans, complains?	Normal	17	94.4%
	Altered	1	5.6%
Is very worried?	Normal	13	72.2%
	Altered	5	27.8%
Doesn't take criticism and complains too much?	Normal	15	83.3%
	Altered	3	16.7%
Searches physical or verbal signs of affection and approval?	Normal	8	44.4%
	Altered	10	55.6%
"Sticks" with adults or is excessively dependent?	Normal	17	94.4%
	Altered	1	5.6%
Demonstrates lack of confidence and is easily embarrassed?	Normal	10	55.6%
	Altered	8	44.4%
Shows off, acts silly in class?	Normal	16	88.9%
	Altered	2	11.1%
Presents signs of emotional issues?	Normal	14	77.8%
	Altered	4	22.2%

		Frequency	Percentage
Tries to manipulate others in his/her favor?	Normal	16	88.9%
	Altered	2	11.1%
Socialization Domain			
Frequents school regularly?	Normal	16	88.9%
	Altered	2	11.1%
Is sociable, interacts with peers?	Normal	18	100.0%
	Altered	0	----
Practices sports or physical activities with rules?	Normal	14	77.8%
	Altered	4	22.2%
Talks about his/her activities?	Normal	9	50.0%
	Altered	9	50.0%
Takes initiative in activities with peers?	Normal	10	55.6%
	Altered	8	44.4%
Talks easily to teachers?	Normal	15	83.3%
	Altered	3	16.7%
Is frequently subject of mockery?	Normal	18	100.0%
	Altered	0	----
Tries new things?	Normal	16	88.9%
	Altered	2	11.1%
Is caring and shows interest in others?	Normal	11	61.1%
	Altered	7	38.9%
Has 2 or 3 close friends?	Normal	18	100.0%
	Altered	0	----
Acts younger than his/her age?	Normal	14	77.8%
	Altered	4	22.2%
Acts older than his/her age?	Normal	18	100.0%
	Altered	0	----

Table 5. Comparison between G1 and G2 CBCL results

CBCL Scales	Dimension	Values
Social Competence Scale	Activity Competence	**χ^2= 3.704; *p*=0.05**
	School Activity	**χ^2= 7.200; *p*=0.007**
	Total Competence	**χ^2= 13.486; *p*=0.001**
Behavioral Problems Scale	Externalizing Problems	**χ^2= 8.690; *p*=0.003**
	Total Problems	**χ^2= 8.690; *p*=0.003**
	Internalizing Problems	χ^2= 2.857; *p*=0.09
Behavioral Syndromes Scale	Social Problems	**χ^2= 4.500; *p*=0.03**
	Thought Problems	**χ^2= 4.433; *p*=0.035**
	Rule-breaking Behaviour	**χ^2= 7.200; *p*=0.007**
	Anxiety/Depression	χ^2= 0.500; *p*=0.48
	Emotional Reactivity	χ^2= 2.090; *p*=0.14
	Somatic Complaints	χ^2= 1.125; *p*=0.28
	Attention Problems	χ^2= 3.200; *p*=0.07
	Aggressive Behavior	χ^2= 3.200; *p*=0.07

However, analysis of the intersection of the results from the School Activity dimension of the CBCL Social Competence Scale and the DSBQ Learning Domain shows different positions when it comes to the learning process of the surviving children and adolescents. Such differences regard the presence of school difficulties (χ^2 = 5.513; p = 0.01), difficulties in memorizing or organizing tasks (χ^2 = 7.200; p = 0.007) and reading difficulties (χ^2 = 5.513; p = 0.01). For all the dimensions

mentioned, the evaluations performed by teachers show more altered scores that those carried out by parents.

DISCUSSION

Behavioral and learning profile of ALL surviving children and adolescents from a parent perspective

Perceptions of their children's behavior by parents of ALL surviving children and adolescents and parents of healthy individuals were compared. The first dimension analyzed refers to the Social Competence Scale, which identified a statistically significant difference between the groups in all its aspects, in favor of the population of healthy children and adolescents. In general, this scale is associated with social interactions, requiring the mobilization of social cognition skills and emotional regulation, also considering school activities (Achenbach, 1991).

Understanding the commitments reported by parents involves the recognition of childhood and, especially, adolescence as stages in which social life is being experienced. However, this experience usually occurs far from hospital environments, where patients are immersed in a rigid and extensive routine of medical procedures, showing greater propensity to reduce interpersonal relationships, which causes difficulties in creating bonds of friendship (Jeon & Kim, 2014).

In this domain, the findings of the present study are consistent with the research conducted by An and Lee (2019), which highlights that the majority of ALL survivors present difficulties in school and friendship in and out of school. For the authors, these difficulties are associated with different aspects, such as changes in physical appearance resulting from treatment and concerns about possible return of the disease.

In this sense, school reintegration is characterized by living with friends that the survivors did not have consistent interactions because they were away from school for long periods during treatment. Thus, they may be depressed for reasons that involve difficulties in friendships and frequent absences from school due to long periods of hospitalization (You, 2006).

Changes in appearance of leukemia survivors, such as very short hair, can affect self-esteem and, consequently, psychosocial relationships, which may lead to anxiety, depression, despair, social isolation, and other diseases (Mertens et al., 2014). The study by An and Lee (2019) points out that ALL surviving children and adolescents felt that their peers' attention was focused on their short hair and other physical signs of illness and treatment, which made them experience heartache and negative feelings.

In addition, there was a fear that teachers' attention could be assessed as a special treatment when they wanted to be recognized as normal, without depending on different treatment. The identification of this possible disparity between reality and the perception of survivors may underlie the psychosocial problems indicated and perceived by the parents who participated in this study.

The second domain analyzed refers to the results of this study that came from the Behavior Problems Scale, notably the dimensions of externalizing behaviors, which evidenced significantly higher occurrence in ALL surviving children and adolescents compared to the control group, with emphasis on the “rule violation behavior” dimension. Worldwide, the prevalence of mental health problems in children and adolescents ranges from 10% to 20%, with behavioral and emotional problems being the most important causes of these changes (Stewart-Brown, 2003). Similarly, with regard to the Brazilian reality, authors warn of the high prevalence of children with behavioral disorders (Anselmi et al., 2004).

The term “Behavior Problems” is controversial as to its definition, although it is generally defined by behaviors or actions considered socially inadequate, representing deficits or behavioral surpluses

that undermine the child's interaction with peers. According to the APA (2014), behavioral problems are disruptive and contain the following disorders: conduct, challenging opponents, and attention.

Borsa et al. (2011) discuss that studies have shown divergences regarding the prevalence of externalizing and internalizing behavior problems in the juvenile population. While some studies suggest that externalizing behaviors are prevalent over internalizing behaviors (Anselmi et al., 2004), other suggest that internalizing behaviors are predominant (Keegstra et al., 2010). Externalizing problems involve impulsivity, physical or verbal aggression, agitation and teasing. Internalizes can be observed when there is excessive worry, withdrawal, sadness, shyness, insecurity and fears. These are often manifested in disorders such as depression, social isolation and anxiety (Achenbach, 1991).

With regard to specific variables and their relationship with behavioral changes, studies indicate that, in general, boys are the ones with the most behavioral problems, especially externalizing ones. In turn, girls with fewer problems in general and complaints refer more intensively to internalizing behaviors (Anselmi et al., 2004). The gender variable needs to be considered in the cultural context, especially those in which the stereotype is identified that boys are more active, aggressive, independent when compared to girls. In turn, girls are more passive, less aggressive and have better social interactions (Borsa et al., 2011).

In the present study, the results regarding the behavioral profiles of children and adolescents surviving ALL, from the perspective of parents, reveal a high prevalence of internalizing behavior problems. These results corroborate previous studies identifying significant symptoms of anxiety and depression in these groups (Sharkey et al., 2019).

Liu et al. (2018) suggest that the experience of hospitalization and painful procedures resulting from cancer treatment may indeed contribute to the development of emotional and behavioral problems. Thus, these difficulties are not considered to be due to the chemotherapy treatment itself, since the treatment of leukemia is long lasting, interfering with the school, family and social routine of children and adolescents. However, it is important to highlight that studies suggest that the immature brain is in the process of development, being strongly susceptible to the impact of stress, causing anatomical and functional changes directly associated with the emergence of behavioral problems, notably depression and anxiety (Kosir et al., 2019).

Finally, despite the absence of significant difference between the prevalence of internalizing problems in the two groups investigated in the present study, similar to what was identified in the above studies regarding cancer survivors, one aspect that can be highlighted is the equally high prevalence of internalizing problems in the control group, since it reaches a level above 25%, while in the other dimensions investigated the average percentage of changes is 5%. Such results are compatible with several recent Brazilian studies (Borges & Pacheco, 2018). Thiengo et al. (2014) conducted a literature review about the prevalence of depression among young people in the country, identifying a variation of 0.6 to 30% of occurrence of depressive disorder. In this review, more than half of the studies indicated prevalence in the range between 5.9% and 12.5%.

Regarding the Behavioral Syndromes Scale, notably the dimensions of Social Contact Problems, Thinking Problems and Rule Violation, the first two dimensions contemplated above seem to reflect difficulties arising from changes in psychosocial relationships, as well as symptoms of depression and anxiety. However, the dimension of difficulties in meeting social norms requires further discussion.

The study by Liu et al. (2018) demonstrates the presence of a persistent pattern of anger and irritable mood among ALL survivors, as well as argumentative and challenging behavior toward authority figures such as parents and teachers. Such profile may negatively affect the social, academic and / or educational functioning of this group and seems to be associated with identified executive dysfunctions as well as conflicts between parents and children.

Corroborating the above results regarding the executive dimension, the study by Fellah et al. (2019) compared the performance of ALL survivors in relation to population norms, demonstrating the presence of significant changes in attention and executive functions in the first group. Surviving

individuals underwent functional magnetic resonance imaging during the performance of the tasks, revealing hypoactivation in the parietal, temporal and right hippocampal cortices, especially in patients diagnosed earlier. Activation was also reduced in the frontal, bilateral temporal and right parietal lobes, due to the greater exposure to methotrexate, which is the basis of antileukemic chemotherapy treatment. These findings provide evidence of brain alterations, which may aid in understanding the neural substrates underlying attentional deficits and the opposing challenging pattern commonly reported among ALL survivors.

Behavioral and Learning Profile of ALL surviving children and adolescents from the teachers' perspective

Regarding the perception of the teachers participating in the present study, three specific domains of change within the clinical group were predominantly mentioned: learning, emotional and social. As to the first domain of learning, it was found that teachers highlighted difficulties in memorization, reading, mathematics and reasoning activities. These results are consistent with those pointed by the study by Plas et al. (2017), which investigated the executive functioning, intelligence, motor skills and mathematical skills of 130 ALL survivors and 158 control subjects aged 8 to 18 years. The survivors group had significant deficits compared to healthy subjects in the domains of working memory, processing speed, addition and subtraction, and numerical operations.

Difficulties in mathematics, commonly identified among ALL survivors, are directly associated with problems in the field of visual attention and changes in visomotor skills resulting from methotrexate administration (Richard et al., 2018). Still in this direction, the study by Gordon (2016) with 16 surviving individuals of ALL and their twin brothers reveals that the clinical group performed worse in the comprehension tasks of reading and reading, as well as in the activities of logical mathematical reasoning.

In turn, in the present study, the difficulties pointed out by teachers in the emotional and social domains were previously discussed. In the emotional dimension, the difficulties highlighted by the surviving children and adolescents to trust others, the presence of shyness and the need for approval were highlighted. Such characteristics can be understood in the context of psychosocial difficulties, notably in the fear of lack of approval and of being considered as requiring special attention. These aspects are directly related to the weaknesses highlighted by teachers in the social domain, namely, the lack of sharing about their activities and the low initiative in seeking colleagues to perform different activities (An & Lee, 2019).

Approximations and distances between the conceptions of parents and teachers

No significant differences were identified in the perceptions of parents and teachers in the domain of behavior. Both groups refer to difficulties in the domain of interpersonal relationships, with the presence of behaviors that denote insecurity, as well as signs of depression and anxiety.

However, this study identified a significant discrepancy between the perceptions of parents and teachers in the learning domain. For teachers, more than half of survivors have difficulties at school, especially when memory, attention, and the specific fields of math and reading are required. However, for parents, only 33% reveal weaknesses in school learning processes.

In order to understand the above data obtained in this investigation, we highlight the results of the study by Sharkey et al. (2019) in which the associations between the executive functions of children surviving ALL and their parents' perception of their children's executive functioning were examined. The results suggest that parents respond to the difficulties presented by their overprotected children, which in their view may be adaptive behavior, but it does not contribute to the development of the child's independence.

In this sense, the study by Huang et al. (2018) investigated the influence of variables related to family profile and functioning of 213 ALL survivors, concluding that family and parental factors contribute to the health of this group. Among the relationships pointed out by the research, one highlights that indicates that mothers with low education tend to have overprotective behavior and their children more symptoms of behavioral changes. Thus, when it is considered that the families that participated in this study are totally from the most disadvantaged socioeconomic levels, one can explain the discrepancy between parents and teachers regarding the presence of school difficulties in the group investigated.

It is important to conclude that learning disabilities in this population may also be associated with the fact that treatment results in prolonged absence from school or school absenteeism. The child survivor of ALL finds several barriers to the realization of their experience in the school context, among which stand out: the restrictions of the antineoplastic treatment itself and its side effects; the unpreparedness of the school staff to welcome the student with cancer; families' fear of keeping the child in school; and the difficulty in communication between the health team and school professionals (Gomes et al., 2017).

In view of this, it is concluded that the diagnosis of cancer, especially acute lymphoid leukemia, associated with long-term treatment and the repercussions they bring to the lives of children and adolescents, is often a traumatic experience. Advances in medicine have elevated cure rates, but the presence of psychosocial difficulties experienced before, during and after treatment is becoming increasingly evident.

The results of this study highlighted how cancer presents itself as a disruptive factor in the developmental trajectory of this group, since it interferes with social activities and imposes new demands on survivors and their families, besides experiencing symptoms of anxiety, depression, school difficulties and somatic complaints. The etiology of these changes is multifactorial, involving cultural and historical aspects that are co-authors of social stereotypes, patterns of family relationships, which in turn are risk factors or protective factors.

Limitations of this study are, in particular, the low sample number. In this sense, there is the need to conduct research to increase the sample size, making it possible to establish prevalence rates of behavioral, emotional and learning disorders among ALL survivors, comparing them with those identified in the population of children and healthy adolescents. Additionally, future studies may contribute significantly to the discussion by investigating possible protective factors such as sports and family support and risk factors. Certainly, the broader understanding of the behavioral, emotional and reintegration difficulties experienced by ALL survivors may support the development and implementation of therapeutic programs that contribute to minimizing the impacts of the disease process.

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