**RESEARCH ARTICLE**

# Quality of Life, Emotional and Behavioral problems in Full-Term Small for Gestational Age Infants at Preschool Age

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**Abstract**
**Objective:** To determine the emotional, behavioral, and developmental problems and quality of life of children born as Term Small for Gestational Age (SGA) in the preschool period, and to compare them with children born as term appropiate for gestational age (AGA).
**Method:** This study conducted as a prospective case control study. Term SGA babies who were followed up in the Neonatal Intensive Care Unit were taken in the study group, while babies born with term AGA were taken in the control group. All participants' parents filled the Sociodemographic form, Child Behavior Checklist (CBCL) and Pediatric Quality of Life Scale (PedsQL) and were asked questions to complete the ADSI by expert psychologists.
**Results:** 20 SGA (63 months ± 7 months) born term and 20 AGA (59 months ± 8 months) born term children were taken in the study group. There was no significant difference between the groups in terms of gestational age, gender, and age at the outpatient clinic. Social problems were significantly higher in the SGA group (p = 0.014). The school functionality score (SchFS) was found to be significantly lower in the SGA group (p <0.01). In the developmental evaluation, there was no statistically significant difference between the two groups.
**Conclusion:** The long-term follow-up of term SGA patients is important, as inadequate recognition or inadequate treatment of the disorders that may arise may cause impairment not only in the quality of life and psychiatric condutions of the patients, but also in their ability to adapt to the society.Key words: Chondroblastoma, lower extremity, pain.
*Keywords:* SGA, behavioral, developmental, emotional, quality of life

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**Introduction**

Small for gestational age (SGA) newborn according to the gestational week is defined as a baby with birth weight below the 10th percentile for the gestational age (1,2). SGA is reported in 3%–10% of all newborns (3). It is widely accepted that SGA newborns are more likely to experience adverse neurodevelopmental and behavioral outcomes than newborns classified as appropriate for gestational age (AGA). Studies have shown that children born as SGA are associated with higher risk of poor neurodevelopmental and behavioral outcomes including minor to major deficits than those with AGA (2,3). SGA babies are more likely to have behavioral problems, low social competence and poor academic performance later in life (4).

Most studies in the literature include preterm, low birth weight SGA infants (5,6) or evaluate SGA infants in terms of behavioral problems in school age and adolescence (7,8). The preschool period is a quite challenging time where multiple factors are involved to recognize and measure psychiatric symptomatology. To the best of our knowledge, only two studies examined behavioral problems of term SGAs in preschool period. In these studies, SGA and control AGA groups have been evaluated in preschool period and it has been determined that behavioral problems were not higher in SGA children (9,10).

Academic performance and functioning expectations are higher for school-age children compared with those for preschool-age children. Therefore, more comprehensive tests can be used to determine a child's developmental level, academic success, cognitive level, and intelligence level compared with those conducted in preschool age. Accordingly, preschool assessment of developmental differences between children born as SGA and AGA may not be reflected in their entire life. In a study investigating preterm and term SGAs and AGAs, Tanis et al. showed that though there was no statistically significant difference, SGA children at school age had an average of 3 points lower IQ (8). In addition, long-term adverse outcomes on language and speech development, fine and gross motor skills have been reported in children born as SGA (5,11,12). However, the developmental outcomes for full-term SGAs are not fully understood yet.

Quality of life (QoL) is a subjective term that is defined as a person's social, emotional, and physical well-being and ability to perform the usual tasks of daily life (13,14). There are relatively few published studies on the health-related quality of life (HRQoL) of babies born as SGA. It is difficult to assess and determine the quality of life in young children. Therefore, in the absence of self-report in pediatric cases, valid and safe parent reports are required (15). In the literature, QoL has mostly been evaluated in preterm and low birth weight children (16). In a national study conducted in Finland, HRQoL has been found to be significantly lower in very low birth weight children compared with full-term controls at 5 years old (16). However, evidence about the QoL of term SGA in at the preschool period is quite insufficient.

To the best of our knowledge, there is no previous study comparing full-term SGA children and AGA children in terms of QoL, emotional and behavioral problems, and developmental levels in the preschool period. For this reason, our aim in this study is: 1) Whether full-term SGA children are at higher risk for emotional and behavioral problems in preschool period compared to AGA children, 2) To determine the quality of life of term SGA children in the preschool period and to compare them with AGA children, 3) To determine whether there are developmental differences in term SGA and AGA children in the preschool period

**Methods**

*Procedure and participants*

Our study was planned as a prospective case–control study. Full-term SGA (gestational age≥37 weeks) babies born between January 1, 2011 and January 1, 2014 and followed up in Gazi Yaşargil Training and Research Hospital Neonatal Intensive Care Unit were planned to be included in the study. Gazi Yaşargil Hospital ethics committee approval was obtained.

*Inclusion / Exclusion Criteria*

The criteria for inclusion in the study group were;

1) To be born after completion of 37 weeks of gestation,

2) To be Small for Gestational Age,

3) Hospitalized, and followed up in the neonatal intensive care unit,

4) Who had accessible medical records of hospital stay, and agreed to take part in the study

The criteria for inclusion in the control group were.

1) To be born after completion of 37 weeks of gestation,

2) To be Appropiate for Gestational Age,

3) Had no history of hospitalization in the neonatal period or chronic disease.

Term baby was defined as a newborn born at the 37th or above gestational week. Fenton curve was used to evaluate birth weight according to gestational age (17). According to the Fenton curve, babies with birth weight below the 10th percentile were evaluated as SGA, whereas those between the 10th and 90th percentile were evaluated as AGA. Having a history of congenital and/or chromosomal anomalies, intrauterine infection, perinatal asphyxia, intracranial hemorrhage, periventricular leukomalacia, ventricular dilatation, hydrocephalus, and microcephaly were excluded from the study. After obtaining approval from the ethics committee, the patients who met the criteria were identified from the hospital database and the patient files were examined. Week of gestation, birth weight, mode of delivery, gender, hospitalization diagnosis and hospitalization periods were examined from the patient files. After examining 65 files, 20 patients who could be contacted and informed about the study were included in the study group. Simultaneously, it was intended to include 20 aged-matched term AGA children who were allowed to the pediatric outpatient clinic for different reasons. Consent was obtained from the families. All cases were planned to be evaluated by a child and adolescent psychiatrist.

### Evaluation Tools

### Sociodemographic Form

The sociodemographic characteristics of the participating children were obtained using the sociodemographic data form developed by the researchers. The child's age, gender, sibling presence, demographic information of the mother and father, the duration of breastfeeding, and the presence of psychiatric disease in the family were evaluated in the form.

### Child Behavior Checklist

The Child Behavior Checklist (CBCL) was developed by Achenbach and Edelbrock (1983) to evaluate emotional and behavioral problems in children aged between 4–18 years in line with the information obtained from parents (18). Adaptation studies of the scale to Turkish children were conducted by Erol et al. (19). The questions in the scale are answered and rated by the parents using a 3-point Likert scale. Options are scored "Not true" as "0", "somewhat or sometimes true" as "1" and "very true or often true" as "2". The scale consists of eight subscales: somatic complaints, withdrawn, anxiety/depression, thought problems, social problems, attention problems, delinquent behavior, and aggression. "i

Internalizing problems" and "externalizing problems." scores are obtained in the scale as two distinct behavioral symptom scores. "Total problem score" is obtained from the sum of subscale scores. Test–retest reliability and internal consistency values were found to be 0.84 and 0.88, respectively (19). In our study, a cut-off points of 65 was established for the scores obtained from the CBCL.

Pediatric Quality of Life Inventory for Ages 5–7 (PedsQL™ 4.0)

The PedsQL™ was developed in 1999 to evaluate the HRQoL in children and adolescents aged in 2–18 years (13). There is only a parent form for ages 2–4 years and both parent and Child/Adolescent forms for ages 5–18 years. The 23-item scale allows for assessment of both healthy children and pediatric patients. The scoring ranges from 0 to 100. "Never" corresponds to 100 points, "rarely" to 75 points, "sometimes" to 50 points, "often" to 25 points, and "almost always" to 0 points. The scores obtained from the items are summed up and then divided by the number of filled items to obtain the total scale score. Scale scoring is presented as total scale score (TSS), psychosocial health total score (PsychoSS), physical health score (PSS). PsychoSS (15 items) is formed by calculating the mean scores of social functioning subscale score (SFS), emotional functioning subscale score (EFS), and school functioning subscale score (SchFS) (13). The Cronbach alpha coefficient was determined as 0.93 for both parent and children's reports (13,14). Üneri et al. performed the study of Turkish validity and reliability for ages 2–4 and 5–7 years (20). The validity of the parental reports was sufficient for both age groups, and the validity of the self-report scale was found to be low for the 5–7 age group (20). In our study, a parent-filled form of the scale for preschool children aged 5–7 years was used.

*Ankara Developmental Screening Inventory*

Ankara Developmental Screening Inventory (ADSI), developed in 1992, is a screening inventory that is often used in Turkey to assess the developmental status of children between the ages of 2 and 66 months (21). ADSI is based on the assessment of 154 items and 4 developmental fields (self-care and social skills, language-cognitive, gross and fine motor development, and general development) answered in the form of "yes" or "no" by mothers. Results for each field are expressed in months and/or years. The Cronbach alpha coefficient were 0.98 for 0–12 months and 0.88 for 13–44 months as well as 45–72 months (21).

### Statistical analysis

Statistical analysis was performed using SPSS version 22.0 (SPSS, Chicago, IL, USA). Kolmogorov–Smirnov and Shapiro–Wilk tests were used to determine data distribution. Mann–Whitney U-test was used to analyze the continuous nonparametric variables; chi-squared or Fisher's exact test was used to compare categorical variables. Normally distributed variables are presented as mean SD, whereas nonparametric continuous variables are presented as median (IQR). Categorical variables are presented as n (%). $P < 0.05$ was considered statistically significant.

### Results

Twenty children born as SGA (68±4.4 months) and 20 children born as AGA (64±6.8 months) at term participated in our study. Approximately 65% (13) of the patients in the SGA group and 60% (12) of the patients in the AGA group were male. There was no significant difference between the SGA and AGA groups in terms of gestational age, gender and age of outpatient evaluation. According to SGA group case report forms, the mean birth weight was 1862±142 g, gestational week was 37.6±1.3 weeks, mode of delivery was 50% (n: 10) normal spontaneous vaginal delivery, median length of stay was 9 (30) days There was no difference between the sociodemographic findings of the SGA and AGA groups. The sociodemographic data of the groups are given in Table 1

The mean scores of the CBCL subscales were compared between the groups. Subscale mean scores of withdrawn was 58±8.4, somatic complaints was 58.2±12, anxiety/depression was 61±11, social problems was 57±8.7, thought problems was 58±7.5, attention problems was 58±9.5, delinquent behavior was 55±7.1, and aggressive behavior was 56.7±8.3 in the SGA group and 54±5.6, 56±6.5, 56±7, 52±4.1, 55±6.6, 54.5±5.1, 55±7.3, 54±6.2 in the AGA group, respectively.

Approximately 30% of children born as SGA had internalizing problems and 25% had externalizing problems. Although not statistically significant, 30% had anxiety-depression problems, 25% had aggressive behavior problems, 20% had attention problems, and these rates were higher than the AGA group. In the social problems subscale, the SGA group scored 57.10 ± 8.74 points, the AGA group 52.10±4.12 points, and social problems were determined to be significantly higher in the SGA group (p:0.01). CBCL assessments of SGA and AGA groups are given in Table 2.

When the PedsQL scale was evaluated, SchFS was found to be significantly lower in the SGA group (70.35±26.92) compared with that in the AGA group (91.76±11.17) (p:0.01). There was not a statistically significant difference between the SGA and AGA groups with regard to TSS, physical PSS, PsychoSS, EFS, and SFS (Table 3).

The evaluation of ADSI showed no statistically significant differences between the groups in terms of developmental retardation in ADSI subtests (p:0.10). (Table 4)

**Table 1.** The Demographic Characteristics of the SGA and AGA Groups

|  | SGA (n:20) | AGA (n:20) | p |
|---|---|---|---|
| Admission age to the polyclinic | 68±4.4 | 64±6.8 | 0.06 |
| Male gender | 13(%65) | 12(%60) | 0.51 |
| Cesarian delivery | 10(%50) | 10(%50) | 1 |
| Gestational age | 37.6±1.3 | 38.1±0.87 | 0.18 |
| Maternal age | 32± 6.2 | 33.6± 5.5 | 0.53 |
| Educational status of the mother |  |  | 0.09 |
|   Pre-high school | 15(%75) | 11(%55) |  |
|   High school and beyond | 5(%25) | 9(%45) |  |
| Mother working status |  |  | 0.09 |
|   Not working | 18(%90) | 14(%70) |  |
|   Working | 2(%10) | 6(%30) |  |
| Mother health condution |  |  | 1 |
|   Healthy | 18(%90) | 18(%90) |  |
|   Chronic illness | 2(%10) | 2(%10) |  |
| Paternal age | 35±4.9 | 36±6.1 | 0.42 |
| Educational status of the father |  |  | 0.09 |
|   Pre-high school | 18(%90) | 14(%70) |  |
|   High school and beyond | 2(%10) | 6(%30) |  |
| Father working status |  |  | 0.49 |
|   Not working | 2(%10) | 0 |  |
|   Working | 1818(%90) | 20(%100) |  |
| Mother health condution |  |  | 0.18 |
|   Healthy | 16(%80) | 19(%95) |  |
|   Chronic illness | 4(%20) | 1(%5) |  |
| Sibling existence | 11(%55) | 13(%65) | 0.56 |
| Consanguineous marriage | 12(%60) | 6(%30) | 0.05 |
| Breast milk time |  |  | 0.71 |
|   <6 months | 6(%30) | 4(%20) |  |
|   ≥ 6 months | 14(%70) | 16(%80) |  |
| Family history of psychiatric illness | 5(%35) | 2(%10) | 0.23 |

**Table 2.** CBCL mean scores of the SGA and AGA groups

|  | SGA group | AGA group | p |
|---|---|---|---|
| CBCL Total Problems | 57±13 | 52±11 | 0.19 |
| Internalizing Scale | 58±13 | 53±11 | 0.15 |
| Externalizing Scale | 53±11.5 | 50±11.4 | 0.38 |
| Withdrawn | 58±8.4 | 54±5.6 | 0.10 |
| Somatic Complaints | 58.2±12 | 56±6.5 | 0.46 |
| Anxious/Depressed | 61±11 | 56±7 | 0.10 |
| Social Problems | 57±8.7 | 52±4.1 | 0.02 |
| Thought Problems | 58±7.5 | 55±6.6 | 0.29 |
| Attention Problems | 58±9.5 | 54.5±5.1 | 0.18 |
| Delinquent Behaviour | 55±7.1 | 55±7.3 | 0.86 |
| Aggressive Behaviour | 56.7±8.3 | 54±6.2 | 0.25 |

*CBCL*: Child Behaviour Check List

**Table 3.** PedsQL mean scores of the SGA and AGA groups

|  | SGA group | AGA group | p |
|---|---|---|---|
| **PSS** | 67±27 | 77±17 | 0.23 |
| **EFS** | 77±15 | 81±15 | 0.47 |
| **SFS** | 82±19 | 89±14 | 0.21 |
| **SchFS** | 70±26 | 91±11 | 0.01 |
| **PsychoSS** | 77±15 | 82±21 | 0.45 |
| **TSS** | 73±19 | 83±12 | 0.84 |

*PedsQL:* Pediatric Quality of Life Inventory. *PSS:* Physical health summary score. *EFS:* Emotional functioning score. *SFS:* Social functioning score. *SchFS:* School functioning score. *PsychoSS:* Psychosocial health summary score. *TSS:*Total scale score.

**Table 4.** ADSI mean scores of SGA and AGA groups

|  | SGA group | AGA group | p |
|---|---|---|---|
| Language-cognitive | 59±11 | 62±10 | 0.32 |
| Fine motor | 56±11 | 62±10.5 | 0.28 |
| Gross motor | 57±7.7 | 53.9±6.4 | 0.17 |
| Social skills/Self-Care | 57.8±9.4 | 55.3±8.5 | 0.42 |
| General development | 61.9±9.8 | 63.8±8.7 | 0.38 |
| ADSI total score (developmental delay)* | 4 (%20) | 0 | 0.10 |
| *ADSI:* Ankara Developmental Screening Inventory | | | |

## Discussion

In our study, children at preschool period between the ages of 4–6 who were born as SGA at term and children who were born as AGA at term in the same age group were compared in terms of behavioral problems, QoL, and developmental levels. It was found that social problem scores were higher, and school functioning scores were lower in children with SGA. In the CBCL assessment of full-term SGA children, 30% of the children had internalizing problems and 25% had externalizing problems. Studies of children born as SGA show conflicting results. In the literature, there are many studies conducted with preterm and low/ very low birth weight (LBW, VLBW) SGA children in various age groups (5-7). These studies have shown that SGA children compared with AGA children have behavioral and emotional problems at various levels and their academic success is lower.

On reviewing the literature, it was shown that SGA is associated with various psychiatric problems, including attention deficit disorder symptoms, learning difficulties, social problems, anxiety-depression and aggression (3,16,22-24). In some studies, SGA delivery has not been found to be associated with higher risk of behavioral problems and psychiatric symptoms (9,10). A large sample study conducted in Canada did not find any statistically significant results for internalizing problems and externalizing problems in SGA-born infants at the age of 4–16 years (23). Children born preterm were not included in our study. It has been shown that children born LBW/VLBW or preterm are at least two times more at risk for emotional and behavioral problems than children born term (4).

In our study, anxiety-depression problems were found in 30% of SGA children, aggressive behavior in 25%, and attention problems in 20%, and although these rates were higher than those in the AGA group, no statistically significant difference was identified. In a study using CBCL, attention deficit, delinquent behaviors and low social competence were found in adolescents born SGA (25). In a large sample sized study evaluating the behavior of full-term children aged 6.5 years, SGA birth was found to negatively

affect social development (26). School is the first environment in which children need to concentrate on specific tasks for a long time and have continuous social interaction within a group. Most externalizing findings are more pronounced in school-age children. The low sample size in our study and the fact that the participants were still in the preschool period may explain these results.

In our study, the SGA group were found to have higher social problems than the AGA group. Low social competence has been reported in children born SGA (25). In a study by Yang et al. SGA was found to negatively affect social development (26). The presence of social problems causes low social competence and may be associated with neurocognitive problems and/or impairment in school functioning at school age (25,27). We can assume that parents who have a baby born SGA are more anxious than parents with AGA children. Therefore, when these children are raised, problems such as parents' concerns about the health status of the child may cause the children to be raised in a more protective environment. Growing up in a more protective environment can affect both the child's social skills and their coping skills. Although there is no consensus about why social problems may be more common in children born with SGA, we think that it could theoretically be one of the effects of growing up in a more protective family environment. Although it is not statistically significant, the presence of anxiety and depression problems in 30% of the SGA group may support this situation.

Because the children participating in the study were in preschool period, the QoL was determined by the parents. In our study, the SchFS was found to be significantly lower in the SGA group compared to the AGA group. We considered that in the SGA group with more social problems, school functionality might be lower in relation to this. The literature is rich in evaluating HRQoL in preterm and/or LBW/VLBW children (16,28,29). It has been found that the QoL in preschool ages and adolescence is often lower in preterm children (29). Zubrick et al. found that SGA children were more likely to have lower academic skills in school (24). In another study, a 10%–15%

increase in school-related problems has been found in SGA cases (22). Term SGA children at ages 12 and 18, was associated with poorer school performance (30). It has also been concluded that SGA infants may have relatively mild disorders that are easily overlooked but may have a significant impact on their QoL later in adulthood (28). However, as much as we know, there is no study comparing children born SGA at term with those born AGA in terms of QoL in the preschool period. We considered that in the SGA group with more social problems, school functionality might be lower in relation to this.

Parents' knowledge of child development, combined with their cultural, social, and educational situation, may lower HRQoL compared with children's self-reports, and/or parents' expectations may affect the HRQoL rating. It is also possible that defining emotional and psychosocial problems requires incorporating more detail than found in the structure of PedsQL. Therefore, we can assume that our results may underestimate HRQoL in SGA children.

ADSI evaluation showed four children (20%) with general developmental retardation in the SGA group, but no statistically significant difference was found compared with that in the AGA group in terms of general development and ADSI subtests. According to a meta-analysis released in 2020, it term SGA children were shown to have cognitive disadvantages from infancy to middle childhood compared with AGA children (27). Lower school success and lower IQ scores have been reported in SGA children (3). However, preterm SGAs were also included in the study sample in which low IQ scores were determined in the aforementioned study. In a study involving preterm and term SGAs and AGAs, interestingly, AGA children exhibited more borderline skills than SGA in terms of motor skills, although this was not statistically significant (8). Arcangeli et al. have reported in a meta-analysis study that neurodevelopmental scores were lower in full-term babies with SGA than full-term babies with AGA (2). In the literature, it has been shown that full-term SGAs have lower motor skills and language development and have poorer cognitive outcomes compared with those in full-term AGAs (5,12). However, it is not known exactly whether all children born SGA are at the same risk. In contrast, the small size of the groups requires careful interpretation of negative findings. While evaluating the harmful effects of born as SGA on development, it should be distinguished from other risk factors such as premature birth, perinatal complications, and serious socioeconomic differences.

Our study has some limitations. The low sample size is one of the limitations of our study. Because 45 of the 65 full-term SGA children born between January 1, 2011 and January 1, 2014, who were supposed to become involved in this study, could not include, the number of cases was limited to 20. Although preschool behavioral problems predict some behavioral problems at school age (9), certain behavioral problems such as inattention may not be detected definitely before starting school. Although the absence of an in-depth psychiatric examination made it difficult to detect emotional and behavioral problems, the use of the CBCL scale, which has been shown to be a valid measure for behavioral and emotional problems, has largely overcome this limitation. QoL assessment was based solely on parent reports, as our sample was not of school age. At the same time, intelligence quotient test could not be added to the developmental assessment because there was no applicable test to this age group in the study center. However, the use of valid and reliable psychometric tests and the inclusion of the control AGA group have largely overcome these limitations. When the results of this study are evaluated, future studies are needed to examine the effects of parental attitude on the quality of life with emotional and behavioral problems in children.

### Conclusions

We think that being SGA (among term babies) may negatively affect the behavior, quality of life and developmental characteristics of the child in the long term. The findings of this study show that routine screening is needed in order to determine preschool children in terms of psychiatric symptoms and quality of life perspective and to prevent problems in later childhood.

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