



Nutritional Status and Body Composition of Adolescents with Borderline Intellectual Functioning in South Korea

*Jong Sung Kim¹, *Hyun Chul Kang², Myoung Eun Park³*

1. College of General Education for Truth, Sincerity, and Love, Kyonggi University, Suwon, South Korea

2. College of Creative Engineering, Kyonggi University, Suwon, South Korea

3. Department of Physical Education, Korea National Sport University, Seoul, South Korea

*Corresponding Author: Email: tanny@kyonggi.ac.kr

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Dear Editor-in-Chief

Borderline Intellectual Functioning (BIF) is an intelligence quotient (IQ) range of 71 to 84 (1). Adolescents with BIF encounter challenges in understanding situations, processing thoughts, grasping new concepts, and integrating information (2). Despite comprising approximately 13% of the global school-age population and about 14% of South Korean adolescents falling into the borderline intelligence category (3), there is a noticeable lack of research on the body composition and nutritional status of adolescents with BIF. Interestingly, autism research has indicated nutritional vulnerability in individuals with selective or picky eating patterns (4). Whether adolescents with BIF exhibit similar, different, or more frequent nutritional issues than typical individuals remains uncertain. Hence, this study aims to assess the nutritional status, body composition, and potential factors influencing body composition levels in adolescents with BIF.

Between January and February 2024, a cohort of 112 adolescents, diagnosed with BIF by a pediatrician and excluding individuals with Rett syndrome, Asperger syndrome, or other autism spectrum disorders, was recruited for the study. Written consent from both adolescents and parents was obtained during their lab visit. A parent in-

terview collected data on adolescents' gender, age, IQ score, parent's education, and monthly family income. Parents completed the Korean version of the International Physical Activity Questionnaire, categorizing weekly physical activity levels as low (<600 MET-min/week), moderate ($\geq 600 \leq 3000$ MET-min/week), and high-intensity (>3000 MET-min/week) (5). BIF adolescents with the assistance of their parents reported their food intake and consumption frequency over the past week using a validated questionnaire (6).

Using SPSS 26.0, we calculated means, standard deviations, and percentages. Binary logistic regression identified predictors for BMI percentiles (P5, P85, and P95) based on the 2000 CDC growth charts (7), using an enter method. Statistical significance was set at $p < 0.05$.

The study comprised 66 male and 46 female participants, with an average age of 15.61 ± 2.23 and an average IQ of 74.05 ± 6.15 . Their average height, weight, and BMI were 164.51 ± 7.34 cm, 59.21 ± 9.95 kg, and 21.73 ± 2.26 , respectively. Fathers' education consisted of 66.1% college graduates, 17.9% with graduate degrees, and 16.1% with a high school diploma or lower. Mothers' education comprised 71.4% college graduates, 17.9% with graduate degrees, and 10.7% with a



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high school diploma or lower. Family monthly income distribution revealed 37.5% with less than \$2,000, 48.2% at \$2,000-\$3,999, 12.5% at \$4,000-\$5,999, and 1.8% at \$6,000 or above. For fathers' physical activity, 52.7% exhibited low levels, 32.1% moderate, and 15.2% high-intensity. As for mothers, 55.4% displayed low levels, 36.6% moderate, and 8.0% high-intensity activity.

Adolescents with BIF reported specific food intake frequencies as follows: for grains, including rice 5.61 ± 1.54 times per week, noodles 4.24 ± 2.05 , rice cake 3.99 ± 2.29 , ramen 4.09 ± 2.17 , cereal 3.97 ± 2.34 , pizza or hamburger 4.07 ± 2.18 , potato 3.98 ± 2.28 , and sweet potato 3.94 ± 2.34 ; for meat, fish, and eggs, including beef barbecue 4.22 ± 2.09 times per week, pork barbecue 4.13 ± 2.13 , beef stew 4.01 ± 2.26 , processed meat 4.15 ± 2.15 , fried chicken 4.16 ± 2.13 , chicken soup 4.13 ± 2.16 , egg 4.38 ± 2.12 , raw fish 3.91 ± 2.36 , grilled fish 4.09 ± 2.17 , fish stew 3.93 ± 2.34 , canned fish 3.92 ± 2.35 , shellfish 3.88 ± 2.40 , and marinated fish 3.80 ± 2.46 ; for beans, Kimchi, and vegetables, including tofu 4.29 ± 2.06 times per week, bean paste soup 4.23 ± 2.10 , lettuce Kimchi 4.97 ± 1.83 , radish Kimchi 4.38 ± 2.14 , and pickled vegetable 3.92 ± 2.53 ; for fruits, including apple 4.26 ± 2.09 times per week, orange 4.40 ± 2.01 , banana 4.21 ± 2.09 , strawberry 4.11 ± 2.20 , watermelon 4.02 ± 2.27 , melon 3.99 ± 2.32 , peach 3.98 ± 2.31 , grape 4.13 ± 2.21 , pear 3.99 ± 2.30 , and tomato 4.07 ± 2.30 ; for milk and dairy products, including milk 4.61 ± 2.06 times per week, yogurt 4.20 ± 2.21 , ice cream 4.14 ± 2.16 , cheese 4.28 ± 2.19 , and soy milk 3.87 ± 2.43 ; and for sweets, including cookies 4.36 ± 2.05 times and candies 4.18 ± 2.17 .

The study further demonstrated that 21.4% of participants had a BMI equal to or greater than the 85th percentile, and 1.8% had a BMI equal to or greater than the 95th percentile. Upon considering age, gender, parent's physical activity level, parent's education level, and family monthly income as independent variables, binary regression analysis indicated that age ($\beta = -0.282$, $p = 0.042$, $OR = 0.745$) emerged as a significant predictor for BMI equal to or greater than the 85th percentile,

suggesting a risk for overweight. However, no significant predictors were found for BMI at or above the 95th percentile, indicating obesity.

Therefore, the study highlights the prevalence of overweight risk among adolescents with BIF, particularly linked to age. It indicates that nutritional issues in this population are more likely related to excessive eating rather than nutritional deficiencies, possibly due to parents' attentive focus on nutrition.

Conflict of interest

The authors declare that there is no conflict of interests.

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