

The Relationship Between Parenting Styles and BMI-for-Age Status Among School-Aged Children in Kudus

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ABSTRACT

Childhood obesity is a multifactorial health problem influenced by family characteristics and parenting practices. However, evidence regarding the association between parenting style and children's nutritional status remains inconsistent. This study examined the association between parenting style and BMI-for-age status among elementary school children in Kandangmas Village, Dawe District, Kudus Regency. A cross-sectional study involved 60 eligible children. Body weight and height were measured to determine BMI-for-age status, categorized as normal, overweight, or obese. Parents or guardians completed a questionnaire assessing authoritarian, democratic, and permissive parenting styles. Data were analyzed descriptively and using Pearson's Chi-Square test, with Cramer's V measuring association strength. Among respondents, 21 (35.0%) had normal BMI-for-age status, 14 (23.3%) were overweight, and 25 (41.7%) were obese. Democratic parenting was most common (41.7%), followed by permissive (33.3%) and authoritarian parenting (25.0%). No statistically significant association was observed between parenting style and BMI-for-age status in the present sample of school-aged children studied ($\chi^2(4) = 4.937$; $p = 0.294$; Cramer's $V = 0.203$). These findings should be interpreted cautiously given the small sample, cross-sectional design, and unmeasured factors, including dietary intake, physical activity, and sedentary behavior. Furthermore, two expected cell counts were below five, warranting caution when interpreting the Pearson test. Larger studies incorporating relevant behavioral and family factors are needed to clarify this relationship and inform childhood obesity prevention strategies.

1. Introduction

Childhood obesity has become an important public health concern because excess body weight during childhood may increase the risk of various health problems and may persist into adolescence and adulthood [1], [2]. The development of overweight and obesity among children is influenced by multiple interacting factors, including dietary intake, physical activity, sedentary behavior, genetic predisposition, and the family environment [2], [3]. Therefore, identifying factors associated with children's nutritional status is important for supporting appropriate prevention strategies.

Nutritional status among school-aged children is commonly assessed using BMI-for-age because body composition changes according to age and differs between boys and girls. The World Health Organization (WHO) provides growth reference standards for children and adolescents aged 5–19 years, allowing BMI to be interpreted according to age and sex [4], [5]. Appropriate assessment of BMI-for-age is important for identifying children with normal weight as well as those who are overweight or obese and may require appropriate intervention.

The family environment plays an important role in shaping children's health-related behaviors. Parents influence children's daily routines, food availability, eating habits, physical activity, and sedentary behavior.

Parenting style refers to the general pattern of parental attitudes and behaviors used when interacting with children. Common classifications include authoritarian, democratic, and permissive parenting styles [6]. Differences in parental communication, supervision, discipline, support, and autonomy may influence children's behavioral development and health-related behaviors. Longitudinal evidence also suggests that parental feeding practices and children's eating behaviors may influence each other over time, highlighting the complexity of parent-child interactions related to food [7].

Several studies have investigated the relationship between parenting style and childhood obesity, but the findings have not been consistent. Triana et al. reported an association between parenting style and obesity among school-aged children [8]. Kakinami et al. found that specific maternal parenting practices predicted subsequent BMI-for-age z-scores among prepubertal children, whereas parenting style itself was not predictive [9]. A systematic review by Sokol et al. found evidence that parenting styles may be associated with children's BMI outcomes, although the strength and direction of the association varied across studies [10]. A systematic review and meta-analysis of longitudinal studies identified bidirectional associations between some parental non-responsive feeding practices and children's eating behaviors, highlighting the complexity of parent-child feeding interactions [7].

In addition to parenting style, children's nutritional status may be affected by behavioral factors such as physical activity and sedentary behavior. Low physical activity and prolonged sedentary behavior may contribute to excess body weight among children [11], [12]. Dietary patterns and consumption of energy-dense foods are also important factors associated with childhood obesity [3], [13]. An umbrella review found that interventions combining nutrition and physical activity can improve BMI outcomes, supporting a multicomponent approach to childhood obesity prevention [14].

Although previous studies have examined parenting style and childhood obesity, differences in population characteristics, cultural context, measurement instruments, sample size, and analytical methods may contribute to different findings. Evidence concerning elementary school children in Kandangmas Village, Dawe District, Kudus Regency, remains limited. Therefore, this study was conducted to examine the association between parenting style and BMI-for-age status among elementary school children in the study area.

The primary analysis in this study compared three BMI-for-age categories—normal, overweight, and obese—across three parenting-style categories: authoritarian, democratic, and permissive. The study aimed to determine whether there was a statistically significant

association between parenting style and BMI-for-age status among elementary school children in Kandangmas Village.

2. Research Method

2.1. Study Design and Participants

This study used a quantitative analytical approach with a cross-sectional design. The study was conducted among elementary school children in Kandangmas Village, Dawe District, Kudus Regency.

2.2. Population and Sample

The population consisted of 150 students in grades III–VI in Kandangmas Village. A total of 60 respondents were selected using probability sampling with simple random sampling.

The sample size was determined using the Slovin formula:

$$n = \frac{N}{(1 + Ne^2)} \quad (1)$$

where $N = 150$ and $e = 0.10$:

$$n = \frac{150}{[1 + 150(0.10)^2]} = 60$$

The inclusion criteria were school-age children aged 8–12 years who attended school in Kandangmas Village and whose parents or guardians provided consent. The exclusion criteria were children with chronic diseases that could affect nutritional status, physical or mental disabilities that could interfere with accurate anthropometric measurement, and respondents who were absent during data collection.

2.3. Variables and Instruments

The independent variable was parenting style and the dependent variable was BMI-for-age status.

Parenting style was assessed using a 30-item questionnaire consisting of 10 items for authoritarian parenting, 10 items for democratic parenting, and 10 items for permissive parenting. Each item used a three-level response scale: Always = 3, Sometimes = 2, and Never = 1. The parenting-style category was determined based on the highest total score among the three dimensions. The questionnaire items are presented in Table 1.

Table 1. Parenting Style Questionnaire

No.	Dimension	Item
1	Authoritarian	Parents determine eating rules that children must follow.
2	Authoritarian	Parents determine children's food choices without asking their opinions.
3	Authoritarian	Parents reprimand children when they do not follow eating rules.
4	Authoritarian	Parents require children to follow a predetermined meal schedule.
5	Authoritarian	Parents strictly limit children's food choices.

No.	Dimension	Item
6	Authoritarian	Parents establish strict rules concerning children's daily activities.
7	Authoritarian	Parents require children to follow established activity rules.
8	Authoritarian	Parents punish children when they violate established rules.
9	Authoritarian	Parents determine children's activities without providing much opportunity for choice.
10	Authoritarian	Parents expect children to obey instructions without discussion.
11	Democratic	Parents discuss food choices with their children.
12	Democratic	Parents explain the reasons for rules established for children.
13	Democratic	Parents give children opportunities to express their opinions.
14	Democratic	Parents consider children's preferences when determining food choices.
15	Democratic	Parents encourage children to choose healthy foods.
16	Democratic	Parents provide examples of healthy lifestyle behaviors.
17	Democratic	Parents encourage children to participate in physical activity.
18	Democratic	Parents praise children when they practice healthy habits.
19	Democratic	Parents explain the effects of eating habits on health.
20	Democratic	Parents allow children to choose preferred activities within established rules.
21	Permissive	Parents allow children to choose the foods they want to eat.
22	Permissive	Parents rarely establish rules regarding children's food choices.
23	Permissive	Parents allow children to eat whenever they want.
24	Permissive	Parents rarely limit children's consumption of sweet foods or beverages.
25	Permissive	Parents allow children to decide which foods they want to purchase.
26	Permissive	Parents allow children to use electronic devices without clear time limits.
27	Permissive	Parents rarely remind children to participate in physical activity.
28	Permissive	Parents allow children to determine their own daily activities.
29	Permissive	Parents rarely reprimand children for violating daily rules.
30	Permissive	Parents give children considerable freedom without establishing many rules.

2.4. Validity and Reliability

The questionnaire was subjected to content validity through expert judgment and empirical validity using Pearson Product-Moment correlation. An item was considered valid when the calculated r value exceeded the r -table value at $\alpha = 0.05$.

Reliability was assessed using Cronbach's Alpha, with Cronbach's Alpha ≥ 0.70 specified as the reliability criterion.

2.5. Anthropometric Measurement

Body weight was measured using a body-weight scale and height was measured using a height-measuring device. BMI was calculated using:

$$\text{BMI} = \frac{\text{body weight (kg)}}{\text{height}^2 (\text{m}^2)} \quad (2)$$

BMI-for-age status was determined according to the WHO 2007 growth reference for children aged 5–19 years [4], [5]. The analysis used three categories: normal, overweight, and obese.

The classification used in the study was:

Normal: $-2 \text{ SD} \leq \text{BMI-for-age Z-score} \leq +1 \text{ SD}$

Overweight: $+1 \text{ SD} < \text{BMI-for-age Z-score} \leq +2 \text{ SD}$

Obese: $\text{BMI-for-age Z-score} > +2 \text{ SD}$

2.6. Data Collection and Ethical Considerations

Data collection involved completion of the parenting-style questionnaire by parents or guardians and anthropometric measurement of the children. Before participation, the study procedures were explained and parental or guardian consent was obtained. Respondent information was handled confidentially and was used only for research purposes.

The study received ethical approval from the Health Research Ethics Committee of Universitas Muhammadiyah Purwokerto under registration number KEPK/UMP/66/II/2026.

2.7. Statistical Analysis

Univariate analysis was used to describe respondent characteristics, parenting style, and BMI-for-age status using frequencies and percentages. Age was described using mean, standard deviation, and range.

The association between the three parenting-style categories and the three BMI-for-age categories was examined using a 3×3 contingency table and Pearson's Chi-Square test with $\alpha = 0.05$.

Cramer's V was calculated to quantify the strength of association. Statistical significance was defined as $p < 0.05$. Two of the nine expected cell counts were below five; therefore, the Pearson's Chi-Square p -value was treated as an approximation and interpreted cautiously.

3. Result and Discussion

3.1. Respondent Characteristics

This study involved 60 elementary school children in Kandangmas Village, Dawe District, Kudus Regency. The mean age of the respondents was 10.03 ± 1.23 years, with an age range of 8–12 years. Most respondents were female, comprising 35 children (58.3%), while 25 children (41.7%) were male. The respondent characteristics are summarized in Table 2.

Table 2. Characteristics of Respondents

Characteristic	n	%
Male	25	41.7
Female	35	58.3
Total	60	100.0

The respondents were school-aged children who were in an important period of physical growth and development. Nutritional assessment during this period is important because BMI-for-age should be interpreted according to age and sex using an appropriate growth reference. The WHO 2007 growth reference provides BMI-for-age references for children and adolescents aged 5–19 years [4].

3.2. BMI-for-Age Status

The distribution of BMI-for-age status showed that 21 children (35.0%) had normal status, 14 children (23.3%) were overweight, and 25 children (41.7%) were obese. Therefore, obesity was the most frequently observed BMI-for-age category among the respondents. The distribution of BMI-for-age status is presented in Table 3.

Table 3. Distribution of BMI-for-Age Status

BMI-for-age status	n	%
Normal	21	35.0
Overweight	14	23.3
Obese	25	41.7
Total	60	100.0

The relatively high proportion of obesity in this sample indicates that excess body weight was common among the respondents. However, this finding represents the BMI-for-age distribution within the study sample and should not be interpreted as the prevalence of obesity among all school-aged children in Kudus Regency.

Childhood obesity is a multifactorial condition influenced by dietary intake, physical activity, sedentary behavior, genetic predisposition, and the family environment [2]. Low physical activity and prolonged sedentary behavior have also been associated with an increased risk of excess body weight among school-aged children [11], [12].

3.3. Parenting Styles

The distribution of parenting styles showed that democratic parenting was the most frequently reported style, accounting for 25 respondents (41.7%). This was followed by permissive parenting with 20 respondents (33.3%) and authoritarian parenting with 15 respondents (25.0%). The distribution of parenting styles is presented in Table 4.

Table 4. Distribution of Parenting Styles

Parenting style	n	%
Authoritarian	15	25.0
Democratic	25	41.7
Permissive	20	33.3
Total	60	100.0

The predominance of democratic parenting indicates that this was the most frequently reported parenting style among the respondents' parents. Democratic parenting is generally characterized by communication, supervision, support, and the provision of age-appropriate autonomy. These characteristics may influence children's health-related behaviors, including eating habits and physical activity.

However, parenting style is only one component of the broader family environment. Previous research has shown that the relationship between parenting style and children's nutritional status is complex and may vary according to the population, parenting dimensions assessed, feeding practices, and other factors affecting child health [8], [10], [15].

3.4. Association Between Parenting Style and BMI-for-Age Status

The verified cross-tabulation showed that among children with authoritarian parenting, 6 had normal BMI-for-age status, 3 were overweight, and 6 were obese. Among children with democratic parenting, 6 had normal BMI-for-age status, 9 were overweight, and 10 were obese. Among children with permissive parenting, 9 had normal BMI-for-age status, 2 were overweight, and 9 were obese. The cross-tabulation of parenting style and BMI-for-age status is presented in Table 5.

Table 5. Cross-Tabulation of Parenting Style and BMI-for-Age Status

Parenting style	Normal	Overweight	Obese	Total
Authoritarian	6	3	6	15
Democratic	6	9	10	25
Permissive	9	2	9	20
Total	21	14	25	60

Pearson's Chi-Square test yielded $\chi^2(4) = 4.937$, $p = 0.294$. Cramer's V was 0.203. Because $p > 0.05$, the analysis did not demonstrate a statistically significant association between parenting style and BMI-for-age status in the study sample.

The descriptive distribution shows that obesity occurred in all three parenting-style groups. Among the authoritarian group, 6 of 15 children were obese; among the democratic group, 10 of 25 were obese; and among the permissive group, 9 of 20 were obese. These descriptive distributions demonstrate that obesity was observed across all parenting-style categories rather than being restricted to a single category.

The absence of statistical significance should not be interpreted as evidence that parenting style has no role in children's nutritional status. Rather, the present data did not provide sufficient statistical evidence of an association within this sample.

The proportion of children classified as obese was identical in the authoritarian and democratic parenting groups (40.0% each), while the permissive parenting group had a slightly higher proportion (45.0%).

However, the overall association between parenting style and BMI-for-age status was not statistically significant ($p = 0.294$). Therefore, these descriptive differences should not be interpreted as evidence that a particular parenting style increases or decreases the risk of obesity.

The present finding does not mean that parenting style has no role in children's nutritional status. Rather, it indicates that a statistically significant association was not detected within this particular study sample. The relatively small number of respondents and the distribution of respondents across nine cells of the 3×3 contingency table may have limited the statistical ability to detect an association.

3.5. Discussion

The present study found that obesity was the most frequently observed BMI-for-age category, accounting for 25 children (41.7%). Normal BMI-for-age status was found in 21 children (35.0%), while 14 children (23.3%) were classified as overweight. This finding indicates that excess body weight was common among the children included in the study. However, because the study involved only 60 children from one village, these findings should be interpreted specifically within the study population and should not be generalized to all school-aged children in Kudus Regency.

Childhood obesity is influenced by multiple interacting factors, including dietary intake, physical activity, sedentary behavior, genetic predisposition, and the family environment [2], [3], [16]. A recent systematic review found that physical activity, sedentary behavior, diet, and sleep tend to cluster over time, with persistent unhealthy behavioral clusters associated with higher adiposity [17].

The study also found that democratic parenting was the most frequently reported parenting style, involving 25 respondents (41.7%). Democratic parenting is generally characterized by communication, parental supervision, support, and the provision of appropriate autonomy. Such characteristics may contribute to the development of children's health-related behaviors. However, general parenting style does not directly describe all parenting practices related to food, physical activity, or sedentary behavior.

The bivariate analysis showed no statistically significant association between parenting style and BMI-for-age status (Pearson's $\chi^2(4) = 4.937$; $p = 0.294$). Cramer's V was 0.203, indicating the magnitude of the observed association. However, the Pearson's Chi-Square result should be interpreted cautiously because two of the nine expected cell counts were below five.

Previous studies have reported varying findings regarding the relationship between parenting style and childhood obesity. Triana et al. reported an association between parenting style and obesity among school-aged

children [8]. Similarly, Kakinami et al. found that specific maternal parenting practices predicted subsequent BMI-for-age z-scores among prepubertal children, whereas parenting style itself was not predictive [9]. A systematic review by Sokol et al. also reported evidence of an association between certain parenting styles and children's BMI outcomes, although the available evidence was not uniform [10].

A recent systematic review and meta-analysis found no consistent association between feeding or parenting styles and adiposity among children aged 6 months to 5 years. However, the evidence was of low quality and derived from high-income countries. Its findings therefore provide contextual evidence rather than a direct comparison with the school-aged population in the present study [18].

The differences between these findings and the present study may be related to differences in sample size, respondent characteristics, socioeconomic and cultural conditions, measurement instruments, parenting-style classification, and analytical methods. Different studies may also measure different dimensions of parenting. General parenting style, feeding practices, dietary control, parental monitoring, and family eating patterns are not necessarily interchangeable concepts.

The relatively small sample size in this study is an important consideration. Only 60 respondents were included and were distributed across three parenting-style categories and three BMI-for-age categories. Consequently, several cells contained relatively small numbers of observations. A small sample may limit the ability of a statistical test to detect an association, particularly when both the independent and dependent variables consist of multiple categories.

Another important consideration is that several factors potentially associated with childhood obesity were not measured in this study. These include dietary intake, frequency of consumption of high-energy foods and sugar-sweetened beverages, physical activity, sedentary behavior, screen time, socioeconomic characteristics, and parental nutritional status. Previous studies have identified these factors as relevant to children's nutritional status [3], [11], [12], [17]. Because these variables were not included in the present analysis, their contribution to the observed BMI-for-age status could not be determined.

A recent systematic review of prospective studies found that physical activity, sedentary behavior, diet, and sleep tend to cluster and persist across childhood and adolescence. Persistent unhealthy behavioral clusters were associated with higher adiposity, supporting the assessment of multiple lifestyle factors in future studies [17].

Physical activity and sedentary behavior are particularly important factors in childhood obesity prevention. WHO recommends that children and adolescents aged 5–17

years engage in an average of at least 60 minutes of moderate- to vigorous-intensity physical activity per day across the week and recommends limiting sedentary behavior, particularly recreational screen time [19], [20]. Because physical activity and sedentary behavior were not measured in this study, their relationship with the BMI-for-age status of the respondents could not be assessed.

Dietary behavior is another important factor. Parents may influence children's food availability, meal patterns, food choices, and eating behavior. However, parenting style alone may not adequately capture these specific practices. Longitudinal evidence indicates that parental feeding practices and children's eating behaviors may influence each other over time [7]. Therefore, future studies should consider assessing parenting style together with specific feeding practices and dietary intake.

The cross-sectional design also limits the interpretation of the findings. Because parenting style and BMI-for-age status were assessed within the same period, the temporal relationship between the two variables cannot be established. The study therefore cannot determine whether parenting style preceded changes in BMI-for-age status or whether other factors influenced both variables.

The findings of this study suggest that childhood obesity prevention should use a comprehensive approach rather than focusing exclusively on parenting style. Families, schools, and healthcare professionals can support healthy dietary practices, adequate physical activity, reduced sedentary behavior, and healthy daily routines. Such an approach is consistent with recommendations for promoting healthy behaviors among children and adolescents [19], [20].

A systematic review reported that group-based, parent-only weight management interventions may improve children's weight status and health-related behaviors, particularly compared with waitlist controls. However, limitations in study quality and participant completion rates require cautious interpretation [21].

Overall, this study did not identify a statistically significant association between parenting style and BMI-for-age status among the 60 school-aged children studied in Kandangmas Village. The result should be interpreted in the context of the relatively small sample size, the cross-sectional design, and the fact that several potentially relevant factors were not measured.

4. Conclusion

This study found that among 60 school-aged children in Kandangmas Village, 21 children (35.0%) had normal BMI-for-age status, 14 (23.3%) were overweight, and 25 (41.7%) were obese. Democratic parenting was the most frequently reported parenting style, involving 25

respondents (41.7%), followed by permissive parenting (33.3%) and authoritarian parenting (25.0%).

The analysis of the three parenting-style categories and three BMI-for-age categories showed no statistically significant association between parenting style and BMI-for-age status (Pearson's $\chi^2(4) = 4.937$; $p = 0.294$; Cramer's $V = 0.203$). Thus, a statistically significant association was not observed in the study sample.

These findings should be interpreted in the context of the relatively small sample size, cross-sectional design, and the absence of measurements of potentially relevant factors such as dietary intake, physical activity, and sedentary behavior. Further studies involving larger and more diverse samples and incorporating these factors are needed to provide a more comprehensive understanding of the determinants of children's nutritional status.

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