



Assessment Of Nutritional Status And Body Composition Of *Galo* School Children Of Arunachal Pradesh, India Using Upper Arm Anthropometry

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Abstract

Upper arm anthropometry potentially provides useful estimations of body composition and nutritional status. This present cross-sectional study examined the body composition and nutritional status of 1411 *Galo* school children (683 boys, 728 girls) aged 5-14 years in West Siang District, Arunachal Pradesh, India. Measurements included height, weight, mid-upper arm circumference (MUAC), and skinfold thickness (SFT). Anthropometric measurements such as height, weight, MUAC and skinfold thickness (TSF) were recorded. Body composition and nutritional status were assessed using upper muscle area (UMA), arm fat area (UFA), and MUAC for height. Age sex specific overall adiposity in TSF, UFA, arm fat index and upper arm fat area estimates were higher among the girls than boys ($p < 0.01$) but UMA and upper arm fat area were higher among the boys than girls ($p < 0.05$). The prevalence of low MUAC for height was higher among girls (19.91%) than boys (10.68%) ($p < 0.05$). These findings provide valuable insights into the body composition and development nutritional status of *Galo* children, highlighting the importance of considering sex-specific differences in anthropometric profiles.

Keywords: Anthropometric, Skinfold thickness (SFT), upper arm anthropometry, School children, *Galo*, Arunachal Pradesh, India.

Introduction

Malnutrition remains a significant public health concern globally, affecting millions of children, particularly in resource-poor settings. School-age children are a vulnerable population, as malnutrition can impact their growth, development, and academic performance. Accurate assessment of nutritional status is crucial for identifying at-risk individuals and informing interventions. Upper arm anthropometry, a non-invasive and cost-effective method, offers a promising approach for evaluating nutritional status in school children. Upper arm anthropometry is a good indicator of nutritional status and body composition of children. Measurements like height, weight, mid-upper arm circumference (MUAC), and skinfold thickness (e.g., triceps and sub-scapular) are often used (Frisancho, 1974, 1989; Rolland-Cachera 1993; Gibson 2005; Hall et al. 2007) in the study of nutrition and growth. A considerable number of epidemiological investigations have been conducted in India to assess body composition and undernutrition among children with these anthropometric measurements, (e.g. Chowdhury et.al. 2007; Chowdhury and Ghosh 2009; Sen et al. 2011; Sen and Mondal 2013; Sen et al. 2015). Several socio-economic variables affect body composition and nutritional status (Sen et al. 2011, 2015; Sen and Mondal 2013; Singh and Mondal 2014; Rengma et al. 2016). Upper-arm muscle area (UMA), total upper arm area (TUA), upper-arm fat area (UFA), arm-fat index (AFI), upper-arm fat area estimate (UFE) and upper-arm muscle area estimate (UME) comprises upper arm anthropometry. Using upper arm anthropometry many studies have been conducted among children with measures like UMA and UFA (e.g., Chowdhury and Ghosh 2009; Basu et al. 2010; Sen et al. 2011, 2015; Sikdar 2012; Singh and Mondal 2014). The upper arm based index, MUAC-for-height is important which can be used as a proxy indicator of nutritional status as it reflects low weight for- height (Shakir 1973; Sommer and Loewenstein 1975) and is considered to be a very easy and reliable

anthropometric measure to assess under nutrition (de Onis et al. 1997; Mei et al. 1997). However, very few studies have utilized this index to assess nutritional status among children (e.g., Anderson 1975; Sen 2009).

Body composition is closely linked to nutritional status, diet, physical activity, sex, and disease prevalence. Its assessment enables the evaluation of muscle mass and body adiposity changes, reflecting nutritional intake, diseases, and health outcomes over time (Thibault et al., 2012; Sen & Mondal, 2013). Body composition changes are crucial in clinical and epidemiological investigations, as poor body composition and low nutritional status can lead to increased morbidity and decreased physical performance (Thibault & Pichard, 2012; Thibault et al., 2012). Anthropometry is a traditional technique for assessing body composition and nutritional status, with new methods emerging in recent decades, including underwater weighing, air displacement plethysmography, bioelectrical impedance analysis (BIA), and dual-energy X-ray absorptiometry (DEXA) (Sun et al., 2003; Kontogianni et al., 2005; Sala et al., 2007; Wells, 2010). Upper arm anthropometry, comprising measures such as upper arm muscle area (UMA), upper arm fat area (UFA), and MUAC-for-height, has gained attention for assessing body composition and nutritional status, particularly among children (Bolzan et al., 1999; Chowdhury & Ghosh, 2009; Sen et al., 2011; Senbanjo et al., 2014; Singh & Mondal, 2014).

Assessing body composition and nutritional status in India poses significant challenges due to the country's vast population, high illiteracy rates, and limited access to healthcare facilities (Mondal and Sen 2010; Sen et al. 2011; Sen and Mondal 2013). Furthermore, body composition assessment during childhood is crucial, as it reflects the impact of environmental factors, early disease, and nutritional status on muscle mass and adiposity. Children are a vulnerable group, highly susceptible to nutritional deficiencies. However, there is a dearth of studies on age-sex specific changes in body composition and standard growth references for school-age children, particularly in relation to upper-arm anthropometry. This study aims to address these gaps by evaluating and describing age-specific body composition and nutritional status among rural school-going children in Arunachal Pradesh, Northeast India, aged 5-14 years. Upper arm anthropometric measures (UMA, UFA, and MUAC-for-height) will be used to achieve this objective.

Materials and Methods:

Study area and sample

The present cross-sectional study was conducted among 1411 children of Arunachal Pradesh, North East India (683 boys, 728 girls) aged 5-14 years and selected using a stratified random sampling method. Simple random sampling was used to choose schools, with priority given to remote locations accessible by road. Prior to data collection, informed consent was obtained from parents, and participation was voluntary. The study adhered to the ethical guidelines outlined in the Helsinki Declaration of 2000 (Touitou et al., 2004), ensuring the well-being and rights of the child participants.

The Galo tribe, a prominent and populous group in Arunachal Pradesh, Northeast India, is primarily concentrated in the West Siang district, sparsely distributed in the southwestern part of East Siang, southeastern Upper Subansiri, and in small pockets in Itanagar, Lower Dibang Valley, and Changlang districts. As a member of the Tibeto-Burman group, the Galo people belong to the Mongoloid stock. With an estimated population of 112,272 (2011 census), they are one of the largest tribes in Arunachal Pradesh. Historically, the Galo have been referred to by various names, including Duba, Doba, Dobah Abor, Gallong Abor, Galong, and Gallong Adi. At present they have been officially recognized as a scheduled tribe under the name Galo.

Age enumeration

Proper care was taken about enumerating correct age of the children. Date of births recorded in the school register was cross-checked by their parents taking into account the birth certificates. The sample of 1411 children has been arranged into ten different age groups from 5 to 14 years at an interval of one year. Both the sexes are presented differently. The decimal age of the subjects were calculated by subtracting the date of birth of the subjects from the date of data collection.

Anthropometric Measurements:

Four anthropometric measurements were collected for this study: height, body weight, mid-upper arm circumference (MUAC), and triceps skinfold (TSF). Measurements followed standard techniques outlined by Martin and Saller (1957), Weiner and Lourie (1981), Lohman et al. (1988), and Gibson (2005).

Measurement Techniques:

Height: recorded using an anthropometer to the nearest 0.10 cm, with the head in the Frankfurt Horizontal plane.

Weight: recorded using a portable digital weighing machine to the nearest 100g, with minimal clothing and bare feet.

MUAC: measured at the midpoint between the acromion and radiale using a non-stretchable tape on the left side to the nearest 0.10 cm.

TSF: measured using a Holtain skin-fold caliper on the left side to the nearest 0.20 mm.

Reliability and Accuracy: Measurements were taken by a single observer (DD). Technical error measurement (TEM) and coefficient of reliability (R) were calculated following Ulijaszek and Kerr (1999). Intra-observer TEM analysis yielded high R values, indicating reliable measurements. TEM values were not incorporated into further statistical analysis.

Data management and statistical analysis

Assessment of upper arm composition

Based on MUAC and TSF the upper arm composition was assessed utilizing the standard equations of Frisancho (1981, 1989). The equations were:

$$TUA\text{ cm}^2 = (MUAC)^2 / (4 \times \pi)$$

$$UMA\text{ cm}^2 = \{MUAC - (TSF \times \pi)\}^2 / (4 \times \pi)$$

$$UFA\text{ cm}^2 = \{(MUAC)^2 / (4 \times \pi)\} - UMA$$

$$AFI = UFA / \{(MUAC)^2 / (4 \times \pi)\} \times 100$$

Assessment of body composition

Using the anthropometric indices of upper arm composition (UFE and UME) the body composition was evaluated following Rolland-Cachera et al. (1997). The following formulae were used to calculate the indices:

$$UFE = MUAC \times (TSF/2)$$

$$UME = \{(MUAC)^2 / (4 \times \pi)\} - UFE$$

Assessment of nutritional status

To evaluate the prevalence of wasting, we employed the MUAC-for-height classification system developed by Mei et al. (1997). This involved comparing age- and sex-specific MUAC values to a reference population. Children with MUAC-for-height measurements below -2SD and -3SD of the age-sex specific reference value were categorized as moderately wasted and severely wasted, respectively.

Statistical analysis

Data analysis was performed using Statistical Package for Social Science (SPSS, version 16.0). To examine relationships between anthropometric variables, Pearson correlation coefficient (r) analysis was employed. One-way analysis of variance (ANOVA) with Scheffe post-hoc testing was used to investigate age- and sex-specific differences. Two-way ANOVA was conducted to control for the effects of age and sex on anthropometric and upper arm composition variables. Chi-square (χ^2) analysis was performed to evaluate sex differences in nutritional status prevalence across various nutritional measures. Statistical significance was set at $p < 0.05$ and $p < 0.01$.

Results

Table 1 presents the age-sex specific distribution of means and standard deviations ($\pm$ SD) for anthropometric and upper arm composition variables, including height, weight, MUAC, TSF, TUA, UMA, UFA, AFI, UFE, and UME, among children. Statistically significant differences were observed between boys and girls for age-sex specific mean height and weight ($p < 0.05$), with values increasing with age. Notably, girls had higher MUAC values than boys from 13 to 14 years old. Analysis revealed similar mean fat accumulation at triceps (TSF) values for both sexes from 10 to 14 years, but significantly higher values for girls is observed in other age groups ($p < 0.01$). Pearson correlation coefficient analysis showed significant correlations between anthropometric variables and upper arm composition measures ($p < 0.01$), except for TSF with UFA and AFI. ANOVA results indicated statistically significant sex-specific mean differences in MUAC, TUA, UMA, and UFA ($p < 0.01$), but not in height, weight, TSF, AFI, UFE ($p > 0.05$). Age-specific mean differences were statistically significant ($p < 0.0001$). Two-way ANOVA revealed significant differences with respect to age and sex in weight, UMA ($p < 0.05$).

Assessment of upper arm composition

Age- and sex-specific mean values for TUA and UMA increased as children aged from 5 to 14 years. However, boys had higher mean TUA and UMA values than girls in the 5-12 year age group, while girls had higher TUA values at 13 and 14 age groups. Interestingly, girls had higher overall mean UFA (18.76 ± 2.64 cm) and TUA (19.34 ± 2.24 cm) values than boys (14.25 ± 3.60 cm and 18.11 ± 3.06 cm, respectively) at 13 and 14 years, although the difference was not statistically significant. Mean UFA values showed an increasing trend with age, with girls having higher values from age 13 to 14 years. Mean AFI values exhibited age-specific trends, ranging from 28.45 (at 5 years) to 47.44 (at 14 years) in boys, and 28.80 (at 5

years) to 49.17 (at 14 years) in girls. ANOVA results revealed statistically significant sex-specific mean differences ($p < 0.05$) in UMA, UFA, AFI between boys and girls. Age-specific mean differences were also significant ($p < 0.05$) in upper arm composition variables. Two-way ANOVA showed significant differences with respect to age and sex in TUA, UMA and UFA.

Prevalence of wasting (low MUAC-for-height)

Table 2 presents the age- and sex-specific prevalence of wasting among children, based on MUAC-for-height reference values by Mei et al. (1997). The results show that boys have a higher prevalence of overall (57.14% vs. 55.38%), moderate (30.43% vs. 26.67%), and severe (0.76% vs. 10.66%) wasting compared to girls. The age-specific prevalence of overall low MUAC-for-height peaks at 10 years for boys (57.14%) and girls at 11 years (55.38%), with the lowest prevalence observed among both boys and girls at 7 years (30.38%) and (45%). The age-sex specific prevalence of moderate low MUAC-for-height ranges from 30.43% (9 years) to 0% (12 years) in boys, and 26.67% (9 years) to 1.43% (11 years) in girls. Severe wasting is only observed in boys, with the highest prevalence at 12 years (3.39%). χ^2 analysis reveals no statistically significant sex differences ($p > 0.05$) in overall, moderate, and severe low MUAC-for-height, except for severe low MUAC-for-height at 8 years ($p < 0.05$).

Discussion

Assessing the nutritional status of children has traditionally relied on anthropometric measurements such as height, weight, mid-upper arm circumference (MUAC), and skinfold thickness. However, this study utilizes upper arm anthropometry as an innovative approach to measure and detect undernutrition. In body composition, the population variations in terms of the amount of muscularity and adiposity, and nutritional status can be attributed to several associated factors such as sex and ethnicity, dietary intake, food habits, physical exercise patterns, socio-economic status and burden of infectious disease in the same (He et al. 2004; Wells 2007; Sen et al. 2011; Thibault et al. 2012; Sen and Mondal 2013; Singh and Mondal 2014; Senbanjo et al. 2014). The study population was a largely homogeneous Mongoloid population. The genetic factors contributing to variability in body composition are not yet fully understood, but research suggests that adiposity (body fatness) has a significant heritable component. This means that individual differences in body fatness can be attributed, in part, to genetic factors. However, it's also possible that specific environmental conditions may influence the expression of these genetic factors, thereby affecting body composition. The selected children for this study were the residents of the same region. Earlier studies reveal that anthropometric measures are very useful and they play a vital role to monitor body composition and nutritional status (Rolland-Cachera 1993; Gibson 2005; Hall et al. 2007). The assessment of body composition and nutritional status has garnered significant attention in both epidemiological and clinical research settings due to its reliability, cost-effectiveness, simplicity, and non-invasiveness, making it an attractive method for large-scale studies. Skinfold thicknesses (e.g., TSF, biceps or sub- scapular) are very useful in quantifying the amount of adiposity and muscularity among children and adolescents (Basu et al. 2010; Sen et al. 2011; Sen and Mondal 2013; Singh and Mondal 2014; Senbanjo et al. 2014). Numerous studies have been conducted across various populations to establish population-specific reference values for upper arm composition, enabling a more accurate assessment of nutritional status and health outcomes. (e.g., Bolzan et al. 1999; Gültekin et al. 2006; Monir et al. 2008; Cicek et al. 2009, 2014; Basu et al. 2010; Sikdar 2012; Senbanjo et al. 2014; Singh and Mondal 2014). The current study reveals that boys exhibit higher muscularity, as measured by Upper Arm Muscle Area (UME), compared to girls. This sex-related difference in muscularity suggests that biological and physiological factors associated with sex may be influencing the development of muscularity in boys and girls, resulting in greater muscularity among boys. Similar trends were reported among Indians (Chowdhury and Ghosh 2009; Basu et al. 2010; Sen et al. 2011; Sen and Mondal 2013; Singh and Mondal 2014) children. The comparison of age- and sex-specific mean values of muscularity of children of the present study with their American counterparts (Frisancho 1981) reflects a very poor nutritional status. The age- and sex-specific mean values of UMA among boys and girls in the present study were also observed to be distinctly below the mean values reported from similar studies among Santal (Chowdhury and Ghosh 2009), Bengali Muslim (Sen et al. 2011), Mising (Sikdar 2012) and Sonowal Kachari (Singh and Mondal 2014). The amount of body adiposity differs with age, sex, environmental conditions, and genotype and serves as a good indicator of the health and nutritional status of children (Rolland- Cachera 1993; He et al. 2004; Wells 2007, 2010; Sen and Mondal 2013). The results showed that the age- and the sex-specific mean of adiposity measures of TSF, UFA, AFI, and UFE were observed to be higher among girls than boys, thereby indicating distinct sexual dimorphism in subcutaneous body fat patterning among the children (Table 1). Sex steroid hormones, particularly estrogen and testosterone, play a crucial role in sexual dimorphism in fat patterns and body composition (He et al., 2004; Wells, 2010; Sen & Mondal, 2013). Estrogen promotes fat storage, leading to higher fat reserves in females,

whereas testosterone enhances fat metabolism, reducing subcutaneous fat in males. These sex differences in body composition are evident even before puberty and were also observed in this study, with significant differences found in adiposity measures (UFA and AFI) and body fat percentages. Our findings align with previous studies conducted in India (Sen et al., 2011; Singh & Mondal, 2014) but contradict those reported for Santal tribal children in West Bengal (Chowdhury & Ghosh, 2009). A comparative analysis with reference data reveals that the children in this study tend to have lower age-specific mean values of Upper Arm Fat Area (UFA) compared to the 5th percentile reference children from the United States (Frisancho, 1981). However, their age- and sex-specific mean UFA values align with those of children from similar ethnic groups, including Santal (Chowdhury & Ghosh, 2009), Bengali Muslim (Sen et al., 2011), Mising (Sikdar, 2012), and Sonowal Kachari (Singh & Mondal, 2014). This highlights the significance of evaluating upper arm composition, including UMA and UFA, to accurately assess body composition and nutritional status. Such assessments can help identify the need for targeted nutritional support, ensuring timely interventions to promote optimal growth and development. MUAC-for-height is an interesting index to assess the nutritional status in the developing countries. Numerous studies have consistently shown a strong correlation between upper arm anthropometric measurements with height, as well as conventional indicators of undernutrition in children, as demonstrated by research conducted by Frisancho and Tracer (1987), Bolzan et al. (1999), and Sen et al. (2011), among others. The results of the present study show a low prevalence of undernutrition using MUAC-by-height among the children (Tables 2). The results show non-prevalence of undernutrition (wasting) among both boys and girls the prevalence of wasting is (10.25%) using UAMAH ($p < 0.05$). A comparison showed that the prevalence of wasting was observed to be 43.1 – 45.3% among Santal (Chowdhury and Ghosh 2009), 88.50 – 91.28% among Bengalee Muslims (Sen et al. 2011), 14.84 – 17.32% among Sonowal Kachari (Singh and Mondal 2014) children. The low prevalence of wasting among children in this study suggests optimal physical growth and protein reserves, indicating a favorable nutritional status. This positive outcome may be attributed to factors such as rising literacy rates and adequate food availability. The utilization of upper arm anthropometric measures, including UAMAH and MUAC-for-height, has enhanced the accuracy of undernutrition assessments, making them a valuable indicator of nutritional health. By leveraging these measures, healthcare providers can effectively screen for potential health issues, thereby reducing the prevalence of morbidity and mortality.

Conclusion

Upper arm anthropometry is a crucial technique for determining body composition and nutritional status, particularly in epidemiological studies, clinical diagnosis, and disease prevalence assessments. The findings of this study provide valuable insights for future research in large epidemiological settings, enabling accurate identification of risks associated with lower or higher adiposity status and informing targeted intervention programs. However, this study has limitations, including its cross-sectional design and lack of exploration into the relationships between nutritional status and socio-economic/demographic indicators, as well as the attainment of menarche among girls, which has been linked to fat body accumulation (Lassek & Gaulin, 2007; Wells, 2010). Despite these limitations, this study recommends the use of upper arm anthropometry, specifically UAMAH and MUAC-for-height, to assess body composition and undernutrition (including wasting) in children. This approach can enhance screening accuracy in epidemiological and clinical investigations, allowing for precise identification of risks related to adiposity and muscularity.

Declaration of interest:

The author declares no competing interests. The author assumes full responsibility for the content, writing, and intellectual integrity of this manuscript.

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Table 1: Age and Sex specified descriptive statistics of the anthropometric variables among the children.

Age	Sex	No.	Weight (Kg)	Height (cm)	MUAC (cm)	TSF (mm)	TUA (cm ²)	UMA (cm ²)	UFA (cm ²)	AFI (cm ²)
			Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD
5	B	63	17.8 1.96	105.86 3.58	16.16 0.69	7.05 0.53	20.78 1.23	14.87 1.69	5.91 0.96	28.45 3.45
	G	69	17.76 2.44	103.15 3.44	15.55 0.73	7.42 0.97	19.24 1.87	13.70 2.30	5.54 3.65	28.8 3.00
6	B	64	19.04 2.14	110.52 3.88	16.25 1.09	6.88 1.23	21.01 1.90	14.96 2.04	6.05 1.00	28.81 4.25
	G	76	18.84 2.56	108.78 3.00	16.7 1.09	7.76 1.39	22.19 1.66	14.76 1.86	7.43 4.32	33.5 3.65
7	B	79	22.41 2.49	116.99 3.68	16.73 0.95	6.63 1.09	22.27 2.10	15.50 2.33	6.77 0.86	30.41 5.16
	G	80	22.7 2.79	113.81 2.79	16.84 3.51	7.49 1.05	22.57 1.24	14.97 1.80	7.60 3.50	33.67 5.46
8	B	76	24.14 2.49	119.46 3.75	17.45 1.44	6.42 1.12	24.23 1.33	16.06 2.30	8.17 0.96	33.72 3.66
	G	74	24.17 2.99	117.77 4.33	16.94 1.30	7.39 1.06	22.84 2.00	15.09 2.45	7.75 2.23	33.92 6.51
9	B	69	27.17 2.33	123.75 3.75	17.64 2.55	6.25 1.38	24.76 1.12	16.24 1.86	8.52 2.45	34.42 6.10
	G	75	26.48 2.70	124.45 4.57	17.73 1.35	7.67 1.14	25.02 1.86	15.81 1.46	9.21 1.32	36.8 5.52
10	B	70	29.37 2.82	129.39 3.08	18.94 1.83	7.74 1.45	28.55 2.33	17.43 2.30	11.12 2.02	38.94 6.32
	G	75	28.81 3.00	127.73 3.05	17.87 1.24	7.71 1.10	25.41 1.48	15.94 2.45	9.47 3.65	37.28 4.57
11	B	60	32.43 2.53	136.19 2.87	19.58 1.07	8.43 1.19	30.51 1.75	18.02 3.00	11.49 2.20	40.94 4.87
	G	70	34.21 2.78	139.68 2.59	19.35 1.50	8.26 1.60	29.8 1.20	17.29 2.88	12.51 3.45	41.97 7.71
12	B	65	33.93 3.02	141.96 3.39	19.75 2.26	9.21 1.24	31.04 1.45	18.18 3.05	12.86 2.32	41.43 5.80
	G	68	35.75 3.40	141 4.50	19.94 1.87	8.76 1.32	31.64 1.54	17.75 2.12	13.89 4.00	43.9 5.60
13	B	71	37.40 3.00	146.01 3.74	20.36 1.83	9.18 1.70	32.99 1.86	18.74 1.86	14.25 3.60	43.19 3.87
	G	65	41.54 3.47	149.29 3.90	22.01 2.72	8.89 1.80	38.55 1.68	19.79 2.34	18.76 2.64	48.67 4.86
14	B	66	43.45 3.79	154.09 3.99	21.9 2.65	9.3 1.00	38.17 1.34	20.06 2.65	18.11 3.06	47.44 3.77
	G	76	43.17 4.75	151.58 5.92	22.23 2.22	8.96 1.44	39.33 1.66	19.99 2.74	19.34 2.24	49.17 4.45
P value			< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001

Table 2. Prevalence of under nutrition (wasting) using MUAC-for-Height among the children

Age	Sex	No	Prevalence of wasting (low MUAC-for-Height)		
			Overall (<-2 SD)	Moderate (<-2 SD to -3SD)	Severe (<-3 SD)
BOYS					
5	Boys	63	32 (50.79)	1 (1.59)	0
6	Boys	64	28 (43.75)	10 (15.63)	0
7	Boys	79	24 (30.38	1 (1.27)	0
8	Boys	76	44(57.89)	20 (26.23)	1(0.76)
9	Boys	69	38 (55.07)	21 (30.43)	0
10	Boys	70	40 (57.14)	8 (11.43)	0
11	Boys	60	26 (43.33)	2 (3.33)	0
12	Boys	65	30 (46.15)	0	0
13	Boys	71	33 (46.48)	8 (11.27)	0
14	Boys	66	28 (42.42)	2 (3.03)	0
GIRLS					
5	Girls	69	33(47.83)	9 (13.04)	0
6	Girls	76	36(47.37)	10(13.16)	0
7	Girls	80	36(45.00)	19 (23.75)	2 (2.50)
8	Girls	74	38(51.35)	18 (24.32)	8(10.66)*
9	Girls	75	37(49.33)	20 (26.67)	2 (2.66)
10	Girls	75	39(52.00)	13 (17.33)	0
11	Girls	70	35(50.00)	1 (1.43)	0
12	Girls	68	33(48.53)	5 (7.35)	1 (1.47)
13	Girls	65	36(55.38)	6 (9.23)	0
14	Girls	76	42(55.26)	10 (13.16)	3 (3.94)

Values in the parentheses indicate percentage. Statistically significant * $p < 0.05$, ** < 0.01