Associations Between Media Consumption Habits, Physical Activity, Socioeconomic Status, and Glycemic Control in Children, Adolescents, and Young Adults With Type 1 Diabetes

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OBJECTIVE—To evaluate the relationship between media consumption habits, physical activity, socioeconomic status, and glycemic control in youths with type 1 diabetes.

RESEARCH DESIGN AND METHODS—In the cross-sectional study, self-report questionnaires were used to assess media consumption habits, physical activity, and socioeconomic status in 296 children, adolescents, and young adults with type 1 diabetes. Clinical data and HbA1c levels were collected. Risk factors were analyzed by multiple regression.

RESULTS—Youths with type 1 diabetes (aged 13.7 ± 4.1 years, HbA1c 8.7 ± 1.6%, diabetes duration 6.1 ± 3.3 years) spent 2.9 ± 1.8 h per day watching television and using computers. Weekly physical activity was 5.1 ± 4.5 h. Multiple regression analysis identified diabetes duration, socioeconomic status, and daily media consumption time as significant risk factors for glycemic control.

CONCLUSIONS—Diabetes duration, socioeconomic status, and daily media consumption time, but not physical activity, were significant risk factors for glycemic control in youths with type 1 diabetes.

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socioeconomic status, physical activity, media consumption time, and seasonality on HbA1c. We present a sample characteristic for HbA1c and all covariates using mean and SD or proportions, respectively. To analyze associations between HbA1c and covariates, we performed univariate analyses. To obtain adjusted results, multiple regression analysis with all covariates as independent variables was executed. The results should be interpreted in an explorative manner. Analyses were performed using SPSS version 18 (SPSS Inc., Chicago, IL).

RESULTS—Clinical characteristics of the 296 youths with type 1 diabetes were as follows: age 13.7 ± 4.1 years, diabetes duration 6.1 ± 3.3 years, BMI-SDS 0.51 ± 0.90, and HbA1c 8.7 ± 1.6%. Overall daily media consumption time was 2.9 ± 1.8 h. Weekly physical activity was 5.1 ± 4.5 h. Neither physical activity nor media consumption time was associated significantly with BMI-SDS (P = 0.15 and P = 0.21). Time of sporting activity was not significantly associated with media consumption time (P = 0.26). Lower HbA1c levels were significantly associated with younger age, shorter diabetes duration, and higher socioeconomic status (Table 1). Youths who spent >3.9 h per day consuming media had significantly higher HbA1c levels compared with those who spent less time consuming media (9.3 vs. 8.4 and 8.5%, P = 0.001) (Table 1). Regression analysis identified diabetes duration, socioeconomic status, and media consumption time as significant risk factors for HbA1c levels (Table 1). Per 1 h more daily media consumption time, we saw a mean enhancement of HbA1c by 0.16% (Table 1).

CONCLUSIONS—The current study is the first to demonstrate that extensive media consumption is a significant risk factor for poor metabolic control in youths with type 1 diabetes irrespective

| Table 1—Univariate and multivariate analysis of HbA1c |
|-------------------------------------------------------|
| **Univariate analysis** |  | **Multivariate analysis (linear regression model)** |
| Sex | Percentage | HbA1c (%)* | P value† | Regression coefficient β (95% CI) | P value |
| Female | 48 | 8.7 ± 1.5 | 0.782 | −0.272 (−0.667 to 0.123) (male vs. female) | 0.177 |
| Male | 52 | 8.7 ± 1.7 | | | |
| Age (years) |  |  |  |  |  |
| 1st quartile (2.9–10.9) | 25 | 8.0 ± 0.9 | <0.001‡ | 0.035 (−0.019 to 0.089) | 0.198 |
| 2nd quartile (>10.9–14.5) | 25 | 8.6 ± 1.3 | 0.158 (0.034–0.283) | 0.013‡ |
| 3rd quartile (>14.5–17.0) | 25 | 9.1 ± 1.8 | 0.565 (0.117–1.013) (moderate vs. high) | 0.014‡ |
| 4th quartile (>17.0–22.0) | 25 | 9.1 ± 1.9 | 0.581 (0.291–1.312) (low vs. high) | 0.002‡ |
| BMI-SDS |  |  |  |  |  |
| 1st quartile (<2.36 to 0.05) | 25 | 8.8 ± 1.8 | 0.262 | −0.004 (−0.213 to 0.205) | 0.970 |
| 2nd quartile (≥0.05–0.55) | 25 | 8.4 ± 1.5 | 0.066 (0.002–0.131) | 0.045‡ |
| 3rd quartile (≥0.55–1.16) | 25 | 8.8 ± 1.7 | 0.066 (0.002–0.131) | 0.045‡ |
| 4th quartile (≥1.16–2.85) | 25 | 8.7 ± 1.5 | 0.066 (0.002–0.131) | 0.045‡ |
| Diabetes duration (years) |  |  |  |  |  |
| 1st quartile (1.0–3.4) | 25 | 8.0 ± 1.3 | 0.001‡ | 0.066 (0.002–0.131) | 0.045‡ |
| 2nd quartile (≥3.4–5.6) | 25 | 8.8 ± 1.8 | 0.066 (0.002–0.131) | 0.045‡ |
| 3rd quartile (≥5.6–8.4) | 25 | 8.9 ± 1.5 | 0.066 (0.002–0.131) | 0.045‡ |
| 4th quartile (≥8.4–16.7) | 25 | 9.1 ± 1.7 | 0.066 (0.002–0.131) | 0.045‡ |
| Insulin pump |  |  |  |  |  |
| No | 79 | 8.8 ± 1.7 | 0.204 | −0.253 (−0.696 to 0.191) (yes vs. no) | 0.262 |
| Yes | 21 | 8.4 ± 1.1 | 0.204 | −0.253 (−0.696 to 0.191) (yes vs. no) | 0.262 |
| Socioeconomic status |  |  |  |  |  |
| Low | 30 | 8.9 ± 1.7 | 0.004‡ | 0.801 (0.291–1.312) (low vs. high) | 0.002‡ |
| Moderate | 37 | 8.5 ± 1.4 | 0.004‡ | 0.801 (0.291–1.312) (low vs. high) | 0.002‡ |
| High | 33 | 8.0 ± 1.0 | 0.004‡ | 0.801 (0.291–1.312) (low vs. high) | 0.002‡ |
| Media consumption (h/day) |  |  |  |  |  |
| 1st quartile (0.1–1.6) | 25 | 8.5 ± 1.5 | 0.001‡ | 0.014 (−0.030 to 0.057) | 0.619 |
| 2nd quartile (1.6–2.6) | 24 | 8.5 ± 1.6 | 0.014 (−0.030 to 0.057) | 0.619 |
| 3rd quartile (2.6–3.9) | 26 | 8.4 ± 1.3 | 0.014 (−0.030 to 0.057) | 0.619 |
| 4th quartile (≥3.9) | 25 | 9.3 ± 1.8 | 0.014 (−0.030 to 0.057) | 0.619 |
| Physical activity (h/week) |  |  |  |  |  |
| 1st quartile (0–2) | 33 | 8.8 ± 1.6 | 0.465 | 0.014 (−0.030 to 0.057) | 0.619 |
| 2nd quartile (≥2–4) | 19 | 8.6 ± 1.8 | 0.014 (−0.030 to 0.057) | 0.619 |
| 3rd quartile (≥4–7) | 26 | 8.6 ± 1.5 | 0.014 (−0.030 to 0.057) | 0.619 |
| 4th quartile (≥7–30) | 22 | 8.9 ± 1.7 | 0.014 (−0.030 to 0.057) | 0.619 |
| Seasonality |  |  |  |  |  |
| Warm season | 12 | 8.6 ± 1.6 | 0.731 | 0.241 (−0.830 to 0.348) | 0.420 |
| Cold season | 88 | 8.7 ± 1.6 | 0.731 | 0.241 (−0.830 to 0.348) | 0.420 |

*Calculation of mean HbA1c ± SD for different subgroups related to covariates. Normal range HbA1c: 4.3–5.6%. †Kruskal-Wallis test. ‡P < 0.05.
of socioeconomic status and physical activity. Several mechanisms possibly explain why media consumption time was associated with glycemic control. First, watching television promotes snacks between meals (20). Adolescents who reported watching more television had greater unhealthy food intake (20,21). Administering the correct insulin dose for ongoing eating during television time is probably more difficult compared with a shared family meal where parents support the child in calculating and injecting the insulin. It is regrettable that our study did not include questions about eating behavior or frequency of snacks during television watching. Second, family structure (e.g., single-parent household), family dynamics, and communication are important determinants of HbA1c in youths with type 1 diabetes (8,10,22). Furthermore, depression of the child and depressive disorders in families are reasons why children watch more or extensively television (23). Regrettably, and as one limitation of our study, we had no detailed data about family structures or coping abilities in families. Lastly, sedentary behavior is associated with less physical activity and overweight status (13,14). Obesity possibly increases insulin resistance with a negative influence on metabolic control (24). However, in our study we did not find any associations between media consumption time and physical activity or BMI. In addition, physical activity in our study was not correlated with glycemic control. Other studies examining physical activity and its influence on metabolic control show controversial results (9,11,25).

In summary, identifying determinants for poor glycemic control is important. However, in many studies, factors such as age, sex, socioeconomic status, frequency of glucose monitoring, and diabetes knowledge together explain only <20% of the variance in HbA1c (4). This is similar to our study, in which 18% of the variance of HbA1c was explained by the examined factors. Therefore, extensive media consumption and many of the risk factors known to date can explain only part of the variance in HbA1c and part of the risk for poor glycemic control. Further studies (e.g., intervention studies) are needed to improve on our understanding of metabolic control.

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