



Title : Linkage of lifestyle factors with morbidity in Indian adolescents

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Introduction: Adolescence is a healthy period of an individual's life, however rapid biological transition accompanied with rapid physical growth and puberty influence adolescents health related behaviors, which may lead to increased susceptibility towards morbidity that hinders their physical and cognitive development and retard their growth; hence, it is critical to study morbidity in adolescents (1). The major risk factors contributing to morbidity include socioeconomic and lifestyle factors. Thus, the aim of our study was 1) to determine the prevalence of morbidity in adolescents belonging to different socioeconomic classes (SEC) 2) to examine linkages between morbidity and lifestyle factors i.e. diet, physical activity and environmental factors.

Methodology: A cross-sectional study on apparently healthy adolescents aged 10-14 years (n=604) from different SEC, was conducted in Gujarat, Western India. The outcome parameters included anthropometric measures, morbidity score, environmental score, physical activity record and diet intake by 24 hour recall. Generalized linear model analysis was used to investigate associations between morbidity status and lifestyle factors (environment, physical activity, diet). Validated questionnaires were used for collecting information on morbidity, physical activity and environmental factors. SEC was classified using modified Kuppaswamy's socioeconomic status scale (2) Nutrient Intakes were calculated using a cooked food database (C-dietV2.1) and database for raw foods (3, 4).

Results: Boys and girls belonging to high SEC were taller and heavier than their counterparts in all other SEC ($p < 0.05$). 45% of low SEC adolescents displayed high morbidity. 42% of adolescents from high SEC, maximum amongst all adolescents, showed low morbidity ($p < 0.001$). 99% of the middle and high SEC adolescents were exposed to good environmental factors, whereas low SEC adolescents were exposed to bad (31%) and poor (25%) environmental conditions. Environmental factors ($p < 0.001$), moderate to vigorous physical activity ($p < 0.01$) ($\beta = 0.616$) and calcium intake ($p < 0.05$) ($\beta = -0.001$) showed negative association with morbidity, after adjusting with socioeconomic and gender differences. There was an increasing trend in morbidity with decrease in type of environment. For good environment, percent morbidity score was $16 \pm 0.5\%$ which increased for fair environment $19 \pm 1.1\%$, further increased for bad environment $21 \pm 1.3\%$ and poor environment $24 \pm 1.4\%$ respectively, after accounting for socioeconomic factors. Similarly, higher the time spent in moderate activity, lower was the morbidity score.

Conclusions: The physically active low SEC Indian adolescents with sub-optimal nutrient intakes and growth, had greater exposure to poor environmental conditions and were more vulnerable to morbidities than their middle and upper SEC counterparts.

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