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**PREVALENCE OF OVERWEIGHT AND OBESITY AMONG SCHOOLCHILDREN
IN RABAT, MOROCCO****PREVALENCE DU SURPOIDS ET DE L'OBESITE CHEZ LES ELEVES DES ECOLES
PRIMAIRES A RABAT, MAROC**Imane Jroundi¹¹ Unit of Training and Research on Public Health and Community Health. School of Medicine and Pharmacy. University Mohamed V, Rabat.Reçu le 03 Juillet 2014 ; accepté le 1^{er} Octobre 2014 ; publié le 12 Novembre 2014Corresponding author: Imane Jroundi – Email: imane.jroundi.fmpr@gmail.com**SUMMARY:**

There is limited information on the prevalence of obesity among Moroccan schoolchildren. The aims of this cross sectional study were to estimate the prevalence of childhood overweight /obesity, and identify their associated factors among schoolchildren in Rabat, Morocco.

During the 2006- 2007 school year, 20 schools were selected using a random sampling of primary schools and all students in the relevant age range were included. Using measured height and weight, overweight and obesity status were defined based on the ITOF standards. Logistic regression was used to calculate adjusted odds ratio (OR) for overweight/ obesity. 778 schoolchildren were selected. Overall, 18.3% of schoolchildren were overweight and 5.3% were obese. After adjusting for age and sex, boys and schoolchildren with a mother who had more than a primary education level were more likely to be obese. Our results showed that overweight and obesity are problems in our sample of Moroccan children. Population based researches are need to document the extent of overweight/obesity among Moroccan children.

RESUME :

La prévalence de l'obésité en milieu scolaire au Maroc est peu documentée. L'objectif de cette étude transversale était d'estimer la prévalence de la surcharge pondérale et de l'obésité chez les écoliers de la ville de Rabat, et d'identifier les facteurs qui leur sont associés. Au cours de l'année scolaire 2006- 2007, vingt écoles ont été sélectionnées à partir d'un échantillon aléatoire des écoles primaires de la ville de Rabat. Tous les élèves de la tranche d'âge concernée ont été inclus dans l'étude. Le surpoids et l'obésité ont été définis sur la base des normes ITOF. Une régression logistique a été utilisée pour calculer les Odds ratio ajustés (OR) pour le surpoids / l'obésité. 778 écoliers ont été sélectionnés. Dans l'ensemble, 18,3% des élèves étaient en surpoids et 5,3% étaient obèses. Après l'ajustement pour l'âge et le sexe, les garçons et les écoliers dont la mère avait un niveau d'éducation supérieur au niveau primaire étaient plus susceptibles d'être obèses. Nos résultats ont montré que le surpoids et l'obésité sont des problèmes dans notre échantillon d'enfants marocains. Des recherches à plus large échelle sont nécessaires pour documenter l'ampleur de la surcharge pondérale / obésité chez les enfants marocains.

Key-words

Schoolchildren, obesity, overweight, prevalence.

Mots-clés

Ecoliers, obésité, surpoids, prévalence.

INTRODUCTION

Childhood obesity is becoming an equally challenging, yet under-recognized, problem in the developing countries, specifically countries from North Africa including Morocco [1-6]. Indeed, few studies in Northern Africa have focused on identifying risk factors for overweight and Obesity in children. However, all countries in epidemiological transition showed an increasing prevalence of overweight among children, which sometimes can even coexist with malnutrition [6].

Currently, Morocco is undergoing a demographic, social, and nutritional transition [7]. With an emerging economy, Moroccans are subject to changes in dietary behaviors, which have led us to suggest that Moroccan schoolchildren may now be at greater risk for obesity than in the past.

While obesity among moroccan adults, its risk factors are well studied [8-12], this phenomenon among children remains unexplored. In fact, for many years, health professionals and nutritionists in Morocco focused on under nutrition and micronutrient deficiency [13]. Consequently, there is no national or local routine surveillance of childhood overweight and obesity prevalence in Morocco. Hence, the aims of the present study were to evaluate the prevalence of overweight and obesity and to determine their associated factors among private and public schoolchildren in the Rabat area during the 2006- 2007 school years.

METHODS

Rabat is the moroccan administrative capital. According to the 2006 census, Rabat counted 21.6350 children on group five to seven years old which represent 9.2% of the total population. Among them 99.6% are in school. A cross-sectional study was conducted among primary schoolchildren in Rabat city from September 2006 to March 2007.

From the government official list of primary schools in Rabat city, we excluded schools that were closed or in recovery at the time of the survey and selected randomly, using random number table a sample of 20 primary schools (10 public and 10 private). The whole school classes were chosen based to the criteria of age: 7 to 10 years old. Thus, in each school, were included all children present on the day of the survey from preparatory classes, elementary school and the first year of middle class.

The children's weight and height were directly measured with balanced digital scales and stadiometer. Face to face interviews were conducted with children to collect data on snack intake during recess and they were asked if they practice a sport, if so, its type, and weather was the duration (in hours) per week and its frequency. Questionnaires were sent to parents to obtain information about their own weight; socio-economic status, maternal education level, current physical activity, breastfeeding history of their children and child's television viewing time.

The primary investigator collected all data. The protocol for this study was approved by the Department of Education. Consent forms and questionnaires were available in two languages (Arabic and French). Consent was obtained from the parents and school directors, and all data were de-identified.

For the descriptive analysis, Body Mass Index (BMI) was calculated and overweight /obesity were defined according to the International Obesity Task Force reference (IOTF) [14-16].

Based on the recommendations of the IOTF, a definition of obesity was a BMI of more than the 95th centile, and overweight was a BMI of more than the 85th centile for age and sex [16].

We used Chi 2 tests to examine associations of overweight/obesity with previously described characteristics and used $p \leq 0.05$ for statistical significance. Logistic regression models were used to estimate adjusted odds ratios (OR) and 95% confidence intervals (CI) for variables associated with overweight and obesity. All statistical analyses were performed using SPSS 11 software (SPSS Inc., Chicago, IL, USA).

RESULTS

From 20 primary schools, 4 refused to participate in the study, resulting in 778 children aged 7-10 years from 16 schools (9 public and 7 private). Parental questionnaire responses were received from 45.6% of parents.

Among children enrolled in the study, 399 (51.3%) were female and 379 (48.7%) were male. Overall 18.3% of schoolchildren were overweight and 5.3% were obese. Figure 1 shows the distribution of the overweight and obesity by age and sex.

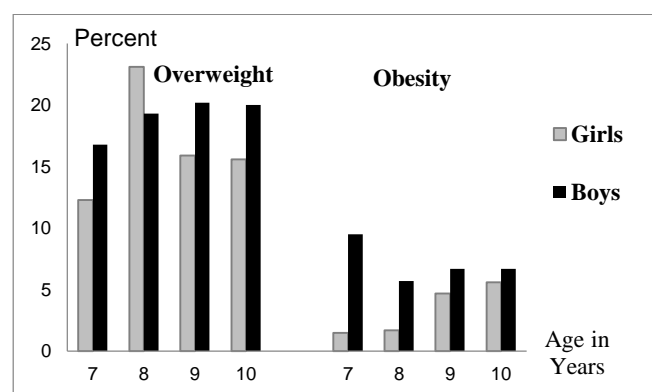


Figure 1: Prevalence of overweight and obesity by age and sex among 778 schoolchildren in Rabat area during the 2006-2007 school year.

Boys had a higher prevalence than girls with the exception of overweight for 8 years old girls. 42% of children report that they spend less than one hour per week to do physical activities, while 21% reported that they practice during 2 hours per week a physical activity. Based on logistic regression analyses, School children who attended private schools were more likely to be overweight compared with those who attended public school (OR=2.01, 95% CI [1.07-3.77]) before adjusting for sex, age, but became non-significant after adjustment (Table 1). After adjusting for these same variables, two characteristics were associated with obesity: being a boy (Adjusted OR=2.64, 95% CI 1.27-4.67), and having a mother with a more than primary education (adjusted OR=1.98, 95% CI 1.03-3.80).

Table I: Characteristics of schoolchildren, crude and adjusted odds ratio and 95% confidence interval for the association between being overweight or obese and selected characteristics among Moroccan schoolchildren.

Logistic Regression Analyses					
		Being Overweight		Being Obese	
	% All respondants	Crude OR (95% CI)	Adjusted OR (95% CI)	Crude OR (95% CI)	Adjusted OR (95% CI)
Age (n=778)					
7-8 years	53.6	1.6 (0.74, 1.54)	0.84 (0.49, 1.44)	0.82 (0.43, 1.53)	1.05 [0.40, 2.72]
9-10 years	46.4	Reference	Reference	Reference	Reference
Sex (n=778)					
Female	51.3	Reference	Reference	Reference	Reference
Male	48.7	1.09 (0.81, 1.47)	0.78 (0.45, 1.33)	2.04 (1.07, 3.89)	2.64 (1.27, 4.67)
School (n=778)					
Public	46.1	Reference	Reference	Reference	Reference
Private	53.9	2.01(1.07, 3.77)	1.66 (0.87, 2.95)	2.65 (1.32, 5.34)	1.37 (0.41, 4.56)
Eating snacks during recess (n=778)					
No	71.3	Reference	Reference	Reference	Reference
Yes	28.7	1.06 (0.96, 1.18)	1.47 (0.83, 2.59)	1.04 (0.98, 1.10)	1.99 (0.78, 5.08)
Breastfed (n=411)					
No	14.4	Reference	Reference	Reference	Reference
Yes	85.6	0.82 (0.43, 1.56)	1.44 (0.63, 3.28)	0.94 (0.86, 1.03)	0.38 (0.12, 1.13)
Practicing physical activity (n=778)					
No	32.3	Reference	Reference	Reference	Reference
Yes	67.7	0.97 (0.88, 1.08)	0.76 (0.42, 1.38)	0.80 (0.29, 2.21)	1.31 (0.40, 4.23)
Watching television (n=271)					
≤ 1 hour/day	30.3	Reference	Reference	Reference	Reference
> 1 hour/day	69.7	1.00 (0.88, 1.13)	1.23 (0.61, 2.46)	1.01 (0.98, 1.12)	1.81 (0.31, 10.52)
Mother's education level (n=401)					
≤ Primary	46.4	Reference	Reference	Reference	Reference
> Primary	53.6	1.21 (0.95, 1.60)	1.25 (0.96, 1.63)	2.67 (1.53, 4.68)	1.98 (1.03, 3.80)
Obesity of one of the parents (n=140)					
No	35.7	Reference	Reference	Reference	Reference
Yes	64.3	1.02 (0.92, 1.13)	0.99 (0.26, 3.67)	1.05 (0.98, 1.12)	2.43 (0.26, 22.10)
Mother employed (n=404)					
No	60.1	Reference	Reference	Reference	Reference
Yes	39.9	1.14 (1.03, 1.26)	1.72 (0.98, 3.02)	1.04 (0.99, 1.09)	1.45 (0.56, 3.79)
Mother is physically active (n=401)					
No	61.1	Reference	Reference	Reference	Reference
Yes	38.9	0.67 (0.44, 1.02)	1.58 (0.92, 2.73)	0.34 (0.14, 0.84)	1.73 (0.63, 4.75)

DISCUSSION

In this survey, we found out that the prevalence of overweight was 18.3%, and obesity was about 5.3%. This study shows that overweight and obesity are problems in the population studied and sorted out that the boys are more exposed than girls, as having a high educated mother. After adjustment for socio-demographic characteristics and obesity associated behaviors, no other variables of study were associated with child overweight. Our results agree with those observed from developing countries and are in a context of nutritional transition, such as Pakistan and Caribbean or Tunisia [17-21], where the prevalence of obesity extend from 8 to 13 % and overweight from 24 to 28%. In our study, obesity was associated with a proxy for socio-economic levels (e.g. higher maternal education level), which is consistent with a study conducted in Pakistan children [20] and which is inversely correlated with the overweight and obesity in developed countries as France, where this nutritional problem affects more the working class population [22-23].

It is the first study within the community, who estimates the overweight and obesity among school children and explored their socio-economical characteristics and collected information about their parent, which allowed us to identify some family behavior related to the education and the supply on which public health action can be taken. In fact, studies shows that the parent's implication in the educational strategies to control overweight, makes the efforts more efficient and sustainable [24-25].

However, our study may be subject to limitations. First, parental questionnaires were based on self-report; so there is the potential for reporting bias. Second, finding might have limited extrapolation because of relatively low response rate on parental questionnaires. Third, dietary intake of schoolchildren and their families were not investigated. Lastly, our study was cross sectional and as such, did not permit identifying the direction of these associations or causality.

In conclusion, this study permits to raise the overweight problem in the Rabat schools. Further studies in various cities of Morocco would be interesting to identify national characteristics of the child obesity. This would lead both the educational and health ministry to implement appropriate strategies adapted to our cultural and social context in order to decrease the problem of obesity in children.

Conflict of interests:

We declare that we have no competing interests.

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REFERENCES

1. **Uauy R, Kain J.** The epidemiological transition: need to incorporate obesity prevention into nutrition programmes. *Public Health Nutr.* 2005; 5 (1A): 223 -229.
2. **De Onis M, Blossener M.** Prevalence and trends of overweight among preschool children in developing countries. *Am J Clin Nutr.* 2000; 72:1032-39.
3. **Cherkaoui Dekkaki I, Mouane N, Ettair S et al.** Prevalence of obesity and overweight in children: a study in government primary schools in Rabat, Morocco. *Arch Med Res.* 2011; 42 (8):703-8.
4. **Nasreddine L, Naja F, Chamieh MC, Adra N, Sibai AM, Hwalla N.** Trends in overweight and obesity in Lebanon: evidence from two national cross-sectional surveys (1997 and 2009). *BMC Public Health.* 2012; 12: 798.
5. **Koubaa A, Younes K, Gabzi Z, Bouslah A, Maalel I, Maatouk El May W et al.** Risk factors of children overweight and obesity. *Tunis Med.* 2012; 90 (5):387-93.
6. **Mansourian M, Reza Marateb M, Kelishadi R, Motlagh ME, Aminaee T, Taslimi M et al.** First growth curves based on the World Health Organization reference in a Nationally-Representative Sample of Pediatric Population in the Middle East and North Africa (MENA): the CASPIAN-III study. *BMC Pediatr.* 2012; 2: 149.
7. **Benjelloun S.** Nutrition transition in Morocco. *Public Health Nutr.* 2002; 5(1A): 135-140.
8. **Tazi MA, Abir-Khalil S, Lahmouz F, Arrach ML, Chaouki N.** Risk factors for hypertension among the adult Moroccan population. *East Mediterr Health J.* 2009; 15(4):827-41.
9. **El Rhazi K, Nejari C, Zidouh A, Bakkali R, Berraho M, Barberger Gateau P.** Prevalence of obesity and associated sociodemographic and lifestyle factors in Morocco. *Public Health Nutr.* 2011; 14(1):160-7.
10. **Jafri A, Jabari M, Dahhak M, Saile R, Derouiche A.** Obesity and its related factors among women from popular neighborhoods in Casablanca, Morocco. *Ethn Dis.* 2013; 23(3):369-73.
11. **Rguibi M, Belahsen R.** Prevalence of obesity in Morocco. *Obes Rev.* 2007; 8 (1):11-3.
12. **Mokhtar N, Elati J, Chabir R, Bour A, Elkari K, Schlossman NP et al.** Diet culture and obesity in northern Africa. *J Nutr.* 2001; 131(3):887S-892S.
13. **UNICEF.** Information by country and programme http://www.unicef.org/infobycountry/morocco_statistics.html#87. (Accessed 29/10/2014).
14. **Chinn S.** Definitions of childhood obesity: current practice. *Eur J Clin Nutr.* 2006; 60: 1189- 94.
15. **Cole JT, Bellizzi MC, Flegal KM, Dietz WH.** Establishing a standard definition for child overweight and obesity worldwide: international survey. *Br Med J.* 2000; 320 (7244): 1240-3.
16. **WHO.** BMI-for-age (5-19 years) [cited 12/10/2011 2011]. Available from:

17. **Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C et al.** Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet*. 2014; 384(9945):766-81.
18. **Tzioumis E, Adair LS.** Childhood dual burden of under- and over nutrition in low- and middle-income countries: a critical review. *Food Nutr Bull*. 2014; 35(2):230-43.
19. **Schwiebbe L, van Rest J, Verhagen E, Visser RWM, Kistvan Holthe J, Hirasing RA.** Childhood obesity in the Caribbean. *West Indian Med J*. 2011; 60(4):442-5.
20. **Regaieg S, Charfi N, Trabelsi L, Kamoun M, Feki H, Yaich S, Abid M.** Prévalence et facteurs de risque du surpoids et de l'obésité dans une population d'enfants scolarisés en milieu urbain à Sfax, Tunisie. *Pan Afr Med J*. 2014 ; 17:57.
21. **Mushtaq MU, Gull S, Mushtaq K, Shahid U, Shad MA, Akram J.** Dietary behaviors, physical activity and sedentary lifestyle associated with overweight and obesity, and their socio-demographic correlates, among Pakistani primary school children. *Int J Behav Nutr Phys Act*. 2011; 8:130.
22. **Moschonis G, Tanagra S, Vondrou A, Kyriakou AE , Dede V, Siatitsa PE et al.** Social, economic, and demographic correlates of overweight and obesity in primary school children. *Public health nutrition*. 2010; 13: 1693-1700.
23. **Padilla N, Biason M.L, Ledésert B.** Prévalence et facteurs de risque de la surcharge pondérale chez les écoliers narbonnais de 5 à 11 ans. *Santé Publique*. 2012; 4(24) : 317-28.
24. **Aguilar Cordero MJ, Ortegón Piñero A, Mur Vilar N, Sánchez García JC, García Verazaluce JJ, García García I, Sánchez López AM.** Physical activity programs to reduce overweight and obesity in children and adolescents; a systematic review. *Nutr Hosp*. 2014; 30(4):727-40.
25. **Treviño RP, Vasquez L, Shaw-Ridley M, Mosley D, Jechow K, Piña C.** Outcome of a Food Observational Study among Low-Income Preschool Children Participating in a Family-Style Meal Setting. *Health Educ Behav*. 2014. pii: 1090198114550823.