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Feeding practice and weight status in children up to 2 years old in Abha City, KSA, 2014.

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Abstract

Background: Childhood weight problems require early preventive measures. Many studies have done in Kingdom of Saudi Arabia (KSA) covering several cities, but it is difficult to follow up on the current situation because access to reliable national data is not always possible.

Objective: To estimate the prevalence and risk factors of overweight, obesity and underweight among children aged below 2 years old in Abha city, KSA.

Materials and methods: A cross-sectional study of children aged 0-24 months, attending the primary health care (PHC) centers. A previously validated questionnaire was used. It consisted of personal characteristics, prenatal history of (smoking, gestational diabetes and obesity), details of feeding practice and other risk factors for obesity (weaning food, TV watching, duration of sleep and who caring of the child).

Results: Among the 373 children, 75.1% had normal weight whereas 14.5% were underweight. Overweight and obesity were reported among 8% and 2.4% of them, respectively. Among various studied risk factors (maternal nationality, educational level, birth weight, taking soft drinks before age of 6 months, not providing food at definite time, providing food several times in large amount during the day, sleeping for continuous long period, watching TV or playing video games more than 1 h/day and maternal overweight during pregnancy) were statistically significant, modifiable and can be the target of interventions.

Conclusion: Weight status problems among children aged below 2 years of mothers attending PHC centers within Abha city is not uncommon. Underweight is more prevalent than overweight and obesity.

Keywords: Childhood weight problems, Overweight child, Child obesity, Underweight child.

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Introduction

Prevention of early childhood weight problem requires a clear understanding of its determinants. This study examined perinatal, parental and lifestyle determinants of childhood underweight, overweight and obesity and how these factors are associated with maternal misperceptions of their children's weight status. Childhood under- and over-weight are an important public health problem, as these conditions tend to have a chronic character (underweight [1]; overweight [2,3]) and predict a wide range of future morbidity. Overweight in children is associated with future cardiovascular diseases, diabetes, and psychosocial problems [2-6]. There is also evidence that a low Body Mass Index (BMI) in early childhood is a risk factor for later coronary heart disease in Western populations [4]. Several risk factors for childhood overweight have been identified, such as parental weight status, early growth and children's physical activity and sedentary behavior, with some of these risk factors seemingly easier modifiable than others. The first few years of life are characterized by rapid growth and encompass several critical periods in children's growth trajectories [7]. Moreover, young children go through remarkable transitions in digestive behavior and evidence points to children's eating behaviors being established by the end of the preschool period and remaining stable thereafter [8]. Different

food approach and food avoidant behaviors of children, as well as three different parenting dimensions will be examined. Moreover, not only overweight and obesity, but underweight will be studied as well. Based on previous studies, we hypothesized that children with high levels of food approach behaviors like food responsiveness have a higher mean BMI and that food avoidant behaviors such as satiety responsiveness and fussiness are associated with a lower mean BMI. Consistent with a child-responsive model, we also expected that parents of children with overweight or high levels of food approach behaviors are more restrictive [9]. These parents would also exert less pressure on their children to eat than parents of children with a normal weight or with high levels of food avoidant behaviors. This study aims to examine whether young children's parental feeding practices is associated with objectively measured BMI in two-year olds. Moreover, not only overweight and obesity, but underweight will be studied as well. Unfortunately, few effective treatments exist for children who already are overweight. Therefore, pre-prevention of obesity is paramount [10]. Preventing the problem, or identifying it early and intervening, is clearly the best solution [10]. Manios et al. [11] was a cross-sectional analysis of 2,374 children, age 1 to 5 years, living in Greece (April 2003 to July 2004). This study found that children with a rapid weight gain in infancy were 1.9 (95% CI: 1.3 to 2.7) times more likely to be overweight and 1.5 (95% CI: 1.2 to 1.9) times more likely to have their weight status underestimated by their mother [12]. Weng et al. [13] conducted a study to determine risk factors for childhood overweight that can be identified during the first year of life to facilitate early identification and targeted intervention. They designed a systematic review and meta-analysis which comparing breastfed with non-breastfed infants found a 15% decrease (95% CI 0.74 to 0.99; I2=73.3%; n=10) in the odds of childhood overweight. For children of mothers smoking during pregnancy there was a 47% increase (95% CI 1.26 to 1.73; I2=47.5%; n=7) in the odds of childhood overweight. There was some evidence associating early introduction of solid foods and childhood overweight.

In Saudi Arabia, childhood obesity has been studied frequently through cross-sectional surveys covering several cities. It is difficult to follow up on the current situation because access to reliable national data is not always possible and accurate information about the rates and time trends is not always applicable [11]. Up to our knowledge, this important topic is not studied previously in our region despite the high prevalence of weight problem in all ages in the last three decades. Health education to new parents in this regards is very essential during their visits to well-baby clinics. This study could alarm PHC providers to the importance of this point.

No association with childhood overweight was found for maternal age or education at birth, maternal depression or infant ethnicity [11]. Gibbs et al. [14] found that the early introduction of solid foods (<4 months) and putting the child to bed with a bottle also increased the likelihood of obesity. They recommended encouragement and support of breastfeeding [13]. Jansen et al. [15] conducted a cross-sectional study using objectively measured BMI for 4987 four years old participating in a population-based cohort in the Netherlands. 13% of the preschoolers had underweight, 8% overweight and 2% obesity. This study provided important information by showing how young children's eating behaviors and parental feeding patterns differ between children with normal weight, underweight and overweight. Part of the association between children's eating behaviors and BMI was accounted for by parental feeding practices (changes in effect estimates: 20-43%), while children's eating behaviors in turn explained part of the relation between parental feeding and child BMI (changes in effect estimates: 33-47%) [14]. The aim of this research is to evaluate the feeding practice for infants and young children (less than two years old) and its relation to their weight status in primary health care, Abha, KSA. This study objectives are to estimate the prevalence of overweight, obesity and underweight among children up to 2 years old in Abha city and to find the risk factors for weight problem among them (prenatal and postnatal) with special emphasis of the role of feeding practice and misconceptions related to it.

Materials and Methods

A cross-sectional study design was carried out on 373 children at Primary Health Care Centers (PHCCs) in Abha City, Aseer Region, KSA. All mothers, who have a child aged 0-24 months, attending primary health care centers (PHCCs) within the Abha city constitute the study population. Following a random sampling technique, three PHCCs were randomly selected. Almost 133 mothers attending these PHCCs in Abha City were interviewed by the researcher. The first 133 mothers with eligible criteria (registered in the PHCC and having at least one child less than 24 months) who attended any one of the three selected PHCCs were invited to participate in the study. The questionnaire was translated into Arabic. A committee of 3 consultants of family medicine and pediatrics revised the study questionnaire. A previously validated questionnaire was used to obtain information on personal characteristics (age of mother, age of child, number of children, nationality, employment status, husband's occupation, education of mother, education of husband, mode of delivery, receiving health education about infant feeding), prenatal history of (smoking, gestational diabetes and obesity), details of feeding practice (breast or bottle feeding, Detailed breast feeding, feeding habits and introduction of solid foods) and other risk factors for obesity (weaning food, TV watching, duration of sleep and who caring of the child). All the required official approvals were fulfilled. All participants were briefed by the interviewer about the objectives of this study.

Weight-for-length values for children were calculated. The weight-for-length values were converted to weight-for-length percentiles for age and gender according to the Centers for Disease Control and Prevention growth charts. Children were classified into the following standardized weight categories: (1) underweight, ≤ 5th

percentile; (2) normal weight, 5th to 85th percentiles; (3) overweight, ≥ 85th to <95th percentiles; and (4) obese, ≥ 95th percentile.

The researcher was available to clarify any issue and recollected soon after encounter. The data were collected using the Statistical Package for Social Sciences (SPSS) software version 20.

Results

The study included 373 children. Their age ranged between one and 24 months with a mean of 10.67 and SD (±) of ± 6.72 months. Table 1 summarizes personal characteristics of the mothers participated in the study. Their age ranged between 18 and 42 years with a mean of 28.91 and SD (±) of ± 5.32 years. Slightly more than half of them (53.6%) aged between 26 and 35 years. Majority of them (86.6%) were Saudis. Almost half of them (49.3%) had at least university grade whereas only 5.1% were illiterate or just able to read and write. Husband`s educational level was university or above among 55.2% of them whereas it was primary school among 5.9% of them. Most of them (82% were not working. Among those working (18%), 89.6% work in governmental places. Less than half of their husbands were working in the government (416%) whereas 32.2% of them were military people. More than one third of them (34.9% had more than three children.

Table 1. *Personal characteristics of the participants (mothers)*

	Categories	Number	Percentage
Age (years)	≤ 25	120	32.2
	26-35	200	53.6
	>35	53	14.2
Nationality	Saudi	323	86.6
	Non-Saudi	50	13.4
Educational level	Illiterate/read and write	19	5.1
	Primary school	33	8.8
	Intermediate school	37	9.9
	Secondary school	100	26.8
	University+	184	49.3
Husband's educational level	Primary school	22	5.9
	Intermediate school	19	5.1
	Secondary school	126	33.8
	University+	206	55.2
Working status	Working	67	18.0
	Not working	306	82.0
Place of work	Governmental	60	89.6
	Private	7	10.4
Husband's job	Governmental	155	41.6
	Private	70	18.8
	Military	120	32.2
	Retired	11	2.9
	Others	17	4.6
Number of children	One	90	24.1
	Two	104	27.9
	Three	49	13.1
	>three	130	34.9

Table 2 summarizes the nutritional characteristics of the index children. Breast feeding started on the first day among majority of them (91.7%). Duration of the breast feeding ranged between two weeks and 24 months (4.5 ± 4.5 months). It was 6 months or less among most of them (79.4%). Artificial feeding was given to most of them (83.8%) in the first 6 months. Initiation of solid foods started at or before 6 months among 87.7% of the index children whereas fruit juices were given at or before age of 6 months among 72% of them. Sugar was added to theses juices in 19.5% of them and they were given in a frequency of more than once/day in 27.1% of them. Soft drinks were given at or before the age of 6 months in 6.4% of the index children whereas they were not given at all among majority of them (89.3%). Among those given soft drinks (n=40), they were given in a frequency more than once/day among 45% of them. Table 3 shows children who took soft drinks at or before age of 6 months tended to be more obese than those who took them after age of 6 months (8.3% versus zero), p=0.036. Other feeding practices were not significantly associated with children weight status. As demonstrated from Table 4, providing food at definite times to children was borderline significantly associated with their weight status (p=0.054). Mothers who reported providing food at definite times had rates of 11.1% of underweight and 1.1% of obesity among their children compared to 17.9% of underweight and 4.2% of obesity among children whose mother did not provide food to them at definite times. Also, providing food several times and in large amounts during the day to children was significantly associated with their weight status (p=0.041). Mothers who reported providing food several times and in large amounts during the day to their children had rate of 5.2% of obesity among their children compared to 0.9% among children whose mother did not follow this behavior.

Discussion

This study revealed that underweight (14.5%) was more reported among children under age of 2 years than overweight (8%) and obesity (2.4%). This is lower than the Sudanese study which reported 35% were underweight [15]. In the current study, maternal overweight during pregnancy was significantly associated with overweight among children up to two years of age. The association of maternal pre-pregnancy/pregnancy BMI with pediatric obesity has been documented consistently in both retrospective and prospective cohorts [16]. In the present study, children of low educated mothers reported higher rates of both obesity and overweight than those of higher educated mothers. On the other hand, children of higher educated mothers reported higher rates of overweight than those of lower educated mothers. So, having nutritional education during the first two years of child`s age was not significantly associated with weight status of the children which make the efficacy of such education questionable. A significant association has been found between birth weight and body weight. High birth weight means they are at higher risk of obesity and also low birth

Table 2. *Breast and additional feeding of the index children*

	Categories	Number	Percentage
Time of breastfeeding initiation	First day After first day	311 28	91.7 8.3
Duration of breast feeding	Range Mean ± SD	2 weeks-24 months 4.5 ± 4.5 months	
	≤ 6 months	269	79.4
	>6 months-12 months	51	15.0
	>12 months	19	5.6
Additional nutrition in the first 6 months (n=339)	Nothing Oral medication Water Artificial feeding	27 49 97 284	8.0 14.5 28.6 83.8
Age of initiation of solid food (months) (n=285)	≤ 6 >6	250 35	87.7 12.3
Age of giving fruit juice (months) (n=236)	≤ 6 >6	170 66	72.0 28.0
Adding sugar to these juices (n=236)	Yes No	46 190	19.5 80.5
Frequency of giving fruit Juice/day	Once 1-3 times >3 times	172 59 5	72.9 25.0 2.1
Age of giving soft drinks (months)	≤ 6 >6 Not given at all	24 16 333	6.4 4.3 89.3
Frequency of giving soft drinks/day (n=40)	Once 1-3 times >3 times	22 12 6	55.0 30.0 15.0

weight means they are at risk of underweight, therefore to identify them and provide an opportunity for modifying their feeding and eating behaviors and controlling weight status from an early stage. Smoking was based on self-report and women tend to underreport their smoking during pregnancy, leading to misclassification, which leads to an underestimation of effect [17]. In accordance, maternal smoking during pregnancy was not significantly associated with children weight status as the true risk will be supposed to be higher than currently reported in the study [18]. Previous studies have been reported that that being a first born child and having fewer children at home were risk factors for childhood obesity In this study, having fewer children was associated with higher rate of obesity a, although it did not reach to a statistically significant level (p=0.058) [19]. Regarding mothers who practicing children feeding such as (providing food at definite time which protect from obesity and providing food several times in large amounts), it was significantly affect the weight status of the children. The same has been reported in a similar Sudanese study [15]. Increased TV viewing/playing video games on mobile time among young children is associated with a raised likelihood of overweight [20]. Reducing television time can lead to decreases in BMI [21]. However, the exact nature and strength of the relationship is unclear [22]. In the present study, watching TV or playing video games on the mobile for an average of more than one hour per day was associated with increased rate of obesity among children in their first two years of life. A number of biological mechanisms have been proposed to link sleep duration and obesity [23]. Previous studies indicate that sleep deprivation results in changes in levels of several hormones including leptin, ghrelin, insulin, cortisol, and growth hormone [24]. These hormonal changes may contribute to energy imbalance and then lead to overweight or obesity. Recently, there is increasing epidemiological evidence suggesting a link between sleep duration and obesity in children [25]. In the present study, duration of sleep was not significantly associated with weight status of children; however the continuous period of sleeping was significantly associated with obesity among them. Rising consumption of sugary soft drinks has been a major contributor to the obesity epidemic among young children in USA [26]. In the present study, giving soft drinks to young children before age6 months was significantly associated with obesity among them. Interestingly, in the present study, mother`s nationality was a significant risk factor as underweight was more reported among children of Saudi mothers whereas overweight and obesity were more reported among children of non-Saudi mothers. This need further in depth investigation. One of the major limitations of this study is that it used a self-administered questionnaire. Furthermore, the compliance of mothers in answering the questionnaire and giving true information might not have been accurate, as the study dealt with sensitive

Table 3. *Association between body weight and breast/additional feeding of the index children*

	Body weight				p-value
	Underweight N=54	**Normal N=280**	**Overweight N=30**	**Obese N=9**	
Breast feeding					
Yes (n=339)	47 (15.3)	253 (73.2)	30 (8.8)	9 (2.7)	
No (n=34)	7 (20.6)	27 (79.4)	0 (0.0)	0 (0.0)	0.174
Time of breast feeding initiation					
First day (n=311)	46 (14.8)	230 (74.0)	28 (9.0)	7 (2.3)	
After first day (n=28)	6 (21.4)	18 (64.3)	2 (7.1)	2 (7.1)	0.323
Duration of breast feeding (months)					
<6 (n=269)	46 (17.1)	196 (72.9)	21 (7.8)	6 (2.2)	
6-12 (n=51)	3 (5.9)	37 (72.5)	9 (17.6)	2 (3.9)	
>12 (n=19)	3 (15.8)	15 (78.9)	0 (0.0)	1 (5.3)	0.086
Age of initiation of solid food (months) (n=285)					
≤ 6 (n=250)	37 (14.8)	183 (73.2)	24 (9.6)	6 (2.4)	
>6 (n=35)	5 (14.3)	29 (82.9)	1 (2.9)	0 (0.0)	0.420
Age of giving fruit juice (months) (n=236)					
≤ 6 (n=170)	22 (12.9)	131 (77.1)	13 (7.6)	4 (2.4)	
>6 (n=66)	6 (9.1)	46 (69.7)	12 (18.2)	2 (3.0)	0.111
Adding sugar to these juices (n=236)					
Yes (n=46)	4 (8.7)	36 (78.3)	6 (13.0)	0 (0.0)	
No (n=190)	24 (12.6)	141 (74.2)	19 (10.0)	6 (3.2)	0.505
Frequency of giving fruit Juice/day					
Once (n=172)	21 (12.2)	128 (74.4)	20 (11.6)	3 (1.7)	
1-3 times (n=59)	5 (8.5)	46 (78.0)	5 (8.5)	3 (5.1)	
>3 times (n=5)	2 (40.0)	3 (60.0)	0 (0.0)	0 (0.0)	0.306
Age of giving soft drinks (months)					
≤ 6 (n=24)	1 (4.2)	17 (70.8)	4 (16.7)	2 (8.3)	
>6 (n=16)	0 (0.0)	16 (100)	0 (0.0)	0 (0.0)	
Not at all (n=353)	53 (15.9)	247 (74.2)	26 (7.8)	7 (2.1)	0.036
Frequency of giving soft drinks/day (n=40)					
Once (n=22)	0 (0.0)	18 (81.8)	2 (9.1)	2 (9.1)	
1-3 times (n=12)	1 (8.3)	11 (91.7)	0 (0.0)	0 (0.0)	
>3 times (n=6)	0 (0.0)	4 (66.7)	2 (33.3)	0 (0.0)	0.188

issues regarding our preserved Saudi culture (smoking, feeding practice, behavioral influences). Finally, the cross-sectional design of the study is also questionable in detecting the cause-effect relationship.

Conclusion

Weight status problems among children (under 2 years of age) within PHCCs at Abha city, KSA is not uncommon. Underweight is more prevalent than overweight and obesity. Risk factors include maternal factors such as nationality, education and overweight during pregnancy. Other factors related to feeding practice such as taking soft drinks before age of 6 months, not providing food at definite time, providing food several times and in large amounts every day. Factors related to the child such as birth weight and sleep quality. Most of these factors are modifiable and can be the target of interventions. Others, like mother`s nationality and birth weight are not modifiable. Non-modifiable factors stress the importance of understanding underlying processes and their cultural context that put individuals with certain attributes more at the risk of weight status problems.

Table 4. *Association between body weight and characteristics of child feeding other than breast feeding*

	Body weight*				P-value
	Underweight N=51	**Normal N=269**	**Overweight N=29**	**Obese N=9**	
Providing food at definite times					
No (n=168)	30 (17.9)	117 (69.6)	14 (8.3)	7 (4.2)	
Yes (n=190)	21 (11.1)	152 (80.0)	15 (7.9)	2 (1.1)	0.054
Providing food once needed					
No (n=109)	8 (7.3)	90 (82.6)	9 (8.3)	2 (1.8)	
Yes (n=2489)	43 (17.3)	179 (71.9)	20 (8.0)	7 (2.8)	0.082
Providing food several times and in large amounts during the day					
No (n=223)	34 (15.2)	172 (77.1)	15 (6.7)	2 (0.9)	
Yes (n=135)	17 (12.6)	97 (71.9)	14 (10.4)	7 (5.2)	0.041
Stop feeding if the child did not desire to eat					
No (n=189)	24 (12.7)	148 (78.3)	12 (6.3)	5 (2.6)	
Yes (n=168)	27 (16.0)	121 (71.6)	17 (10.1)	4 (2.4)	0.432
Try to feed the child against his desire					
No (n=331)	51 (15.4)	243 (73.4)	28 (8.5)	9 (2.7)	
Yes (n=27)	0 (0.0)	26 (96.3)	1 (3.7)	0 (0.0)	0.062
Motivate the child by special means to eat more than needed					
No (n=231)	31 (13.4)	181 (78.4)	15 (6.5)	4 (1.7)	
Yes (n=127)	20 (15.7)	88 (69.3)	14 (11.0)	5 (3.9)	0.182

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