Obesity and its co morbidities in children and adolescents

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ABSTRACT

Background: Obesity has become one of the most important public heath problems all over the world.An epidemic of obesity is affecting children and adolescents across the developed and developing countries in recent years. As the prevalence of obesity increased, so did the prevalence of co morbidities like metabolic and endocrine diseases.

Objectives: To overview obesity clinical features and the prevalence of associated co morbidities in children and adolescents attended the obesity researches and therapy center in Alkindy medical collage.

Type of study: This is a cohort observational study

Methods : Obese child and adolescents aged 4-15year attended the obesity research and therapy unit in AL Kindy medical collage from the 1st of September to the 31st of October 2015,

Results: Children and adolescents are equally susceptible to obesity but Girls are twice susceptible to have obesity than boys 34:16 (68%: 32%). The study shows that all patients have BMI>95th and 84% of them have BMI >99th percentile. Only 26% of patients have height more than 95th percentile. More than 2/3 of patients have snoring and other sleep disorders, most of them are adolescent boys. 22% are hypertensive mainly adolescents.42% have hyperglycemia,40% hypercholestremia, and 70% have high triglyceride level with no gender or age group association. Increased appetite (88%), family history of obesity(82%) and sedentary life style (76%) are the most common causes of children and adolescents obesity.

Conclusion: Novel approaches in the prevention and treatment of childhood and adolescent obesity are urgently required particularly to family behavior pattern.

Key words: Obesity, childhood, adolescent.
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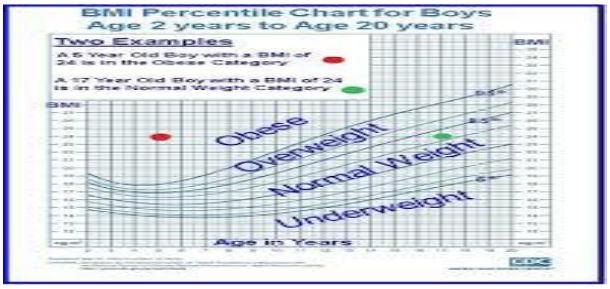
Obesity defined by WHO as an abnormal or excessive fat accumulation in the body that present a risk to health. It has become one of the most important public health problems all over the world. Today, 2.1 billion people, nearly 30% of the world population are either obese or over weight according to a new first of kind analysis of trend data from 188 countries. (1) Child hood obesity is one of the most serious public health challenges of the 21st century. An epidemic of obesity affecting children and adolescents across the developed and developing world in recent years, and now it is the most common pediatric disease. It has over taken under weight in prevalence in many developing countries. (2) Between 1980 and 2013 the prevalence of over weight and obesity increased in all pediatric age group, in both sexes and in various ethnic and racial groups by nearly 50% in the developed Countries and more than 28% in the developing countries. As the prevalence of obesity increased so did the prevalence of the co morbidities associated with like :- -hypertension -ischemic heart disease -diabetes type 2 -non alcoholic fatty liver -Endocrine diseases -Depression . In the last 3 decades not one country has achieved success in reducing obesity rate, so we expect obesity to rise steadily as incomes rises unless urgent steps are taken to address this public health crises. (3) How we can evaluate obesity? In clinical practice and epidemiology, body fat content can rarely be measured accurately, so the best available option to diagnose obesity is the body mass index (BMI). BMI = weight (k gm)/ square height (meter). (4) *In children and adolescents the BMI changes with the age and gender, that's why we use the centile charts.



*Definition of obesity in children according to WHO : **Over weight :** one standard deviation BMI for age and sex.Which means BMI between 85th-95th percentile. **Obese child :** two standard deviation BMI for age and sex.Which means BMI equal to or above 95th percentile. (2)

Patients and methods: A cohort observational study of 50 child seeking management for their over weight

from the 1st of September to 31st of October 2015, who completed all investigations needed.Patients divided according to gender, and age

*Children: - age 4-10 year.

*Adolescents: - age 11-15 year.

Full medical history and family history was taken.Full clinical examination included height, weight, blood pressure, waist circumference established. Investigations ordered were FBS, S.Cholestrol , Triglyceride , HDL ,LDL , Hb ,TSH , liver function test to all 50 patients. S. cortisole, ACTH level and 24 hour urine collection for cortisol level for only 6 patients who suspected to have Cushing syndrome. Other investigations like S.testosterone, S.progesterone, FSH, LH, abdominal sonar and MRI requested for 3 patients suspected to have poly cystic ovary, precocious puberty, and gynecomastia respectively. Standard Blood pressure measurements. Lipid profile. Fasting Blood Sugar and liver enzymes levels used in this study according to American heath association values in children.

Statistical analysis:* SPSS statistical program version 22 was used in statistical analysis*All data were presented in tables.*Chi square test was used to show any significant association between related variables.*P value equal to or less than 0.05 was considered as significant association

Results. Results of the present study are illustrated in the following tables.

Age and gender:-

Table.1. distribution of patients according to their gender and age group

Age group	emale	%	Male	%	Total NO	%
Children 4 y-10 y	18	75%	6	25 %	24	48%
Adolescent 11y-15y	16	61.5 %	10	38. 5%	26	52%
Total NO	34		16		50	100 %
percentage	68%		32 %			%100

Table .2. Distribution of obese children according their age and gender in relation to their heights

		Above 95th percentile	Normal height	total NO	Chi sq.	P value
Gender	Male	3 - 19%	13 - 81%	16	0.844	0.35
	Female	10 - 29%	24 - 71%	34		
Age group	4-10 yr	10 - 42%	14 - 58%	24	5.16	0.22
	11-15 yr	3 - 11.5%	23 - 88.5%	26		
Total NO		**13 - 26%**	**37 - 74%**	**50**		

Height:-

Waist circumference:-

All the patients have waist circumference above the 90th percentile.

BMI:-

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Table .3. distribution of obese children according their age and gender in relation to their BMI percentile

		percentile						
	Patients	Above 95th percentile	%	Above 99th percentile	%	total	Chi sq.	P value
Gender	Male	2	12.5%	14	87.5%	16	0.3	0.58
	Female	6	18 %	28	82 %	34		
Age group	4-10 y	4	17 %	20	83 %	24	0.015	0.9
	11-15y	4	15 %	22	85 %	26		
Total NO		**8**	**16 %**	**42**	**84 %**	**50**		

Blood pressure:-

Table .4. distribution of obese children according their age and gender in relation to blood pressure

		High blood pressure						
		yes	%	No	%	Total	Chi sq.	P value
Gender	Male	6	37.5%	10	62.5 %	16	3.29	0.069
	Female	5	15 %	29	85%	34		
Age group	4-10 yr	1	4%	23	96%	24	8.5	0.0034
	11-15 yr	10	38.5%	16	61.5 %	26		
Total NO		**11**	**22 %**	**39**	**78%**	**50**		

Snoring:-

Table .5. distribution of obese children according their age and gender in relation to snoring during sleep

		Snoring						
		yes	%	No	%	Total	Chi sq.	P value
Gender	Male	15	94%	1	6%	16	5.5	0.018
	Female	21	62%	13	38%	34		
Age group	4-10 yr	14	58%	10	42%	24	4.27	0.038
	11-15 yr	22	85%	4	15%	26		
Total NO		**36**	**72%**	**14**	**28%**	**50**		

Sleep disorder:- (sleep hypo apnea, sleep interruption, sleep apnea**).**

Table .6. distribution of obese children according their age and gender in relation to sleep disorder

		Sleep disorder						
		Yes	%	No	%	Total	Chi sq.	P value
Gender	Male	9	56%	7	44%	16	4.18	0.04
	Female	9	26.5%	25	73.5%	34		
Age group	4-10 yr	4	17%	20	83%	24	7.4	0.006
	11-15 yr	14	54.5%	12	46%	26		
Total NO		**18**	**36%**	**22**	**44%**	**50**		

Hyperglycemia:-

Table .7. distribution of obese children according their age and gender in relation to hyperglycemia

		Hyperglycemia						
		Yes	%	No	%	Total	Chi sq.	P value
Gender	Male	7	44 %	9	56%	16	0.29	0.85
	Female	14	41 %	20	59%	34		
Age group	4-10 yr	8	33 %	16	67%	24	1.4	0.23
	11-15 yr	13	50 %	13	50%	26		
Total NO		**21**	**42 %**	**29**	**58%**	**50**		

Hypercholestremia:-

Table .8. distribution of obese children according their age and gender in relation to cholesterol level

		Hypercholesteremia						
		Yes	%	No	%	Total	Chi sq.	P value
Gender	Male	5	31%	11	69%	16	0.75	0.38
	Female	15	44%	19	56%	34		
Age group	4-10 yr	9	37.5 %	15	62.5%	24	0.12	0.7
	11-15 yr	11	42%	15	58%	26		
Total NO		**20**	**40%**	**30**	**60%**	**50**		

Serum triglyceride:-

Table .9. distribution of obese children according their age and gender in relation to serum triglyceride level

		High triglyceride level						
		Yes	%	No	%	Total	Chi sq.	P value
Gender	Male	13	81%	3	19%	16	1.4	0.23
	Female	22	65%	12	35%	34		
Age group	4-10 yr	15	62.5 %	9	37.5%	24	0.25	0.26
	11-15 yr	20	77%	6	23%	26		
Total NO		**35**	**70%**	**15**	**30%**	**50**		

Liver enzymes:-

Table .10. distribution of obese children according their age and gender in relation to liver enzymes level

		High liver enzymes						
		yes	%	No	%	Total	Chi sq.	P value
Gender	Male	6	37.5%	10	62.5 %	16	1.6	0.2
	Female	7	20.5%	27	79.5 %	34		
Age group	4-10 yr	7	29%	17	71%	24	0.2	0.6
	11-15 yr	6	23%	20	80%	26		
Total NO		13	26%	37	74%	50		

Table .11. **Prevalence of co morbidities in patients**.

	co morbidities	Male	%	Female	%	Total No	Total %
1	Snoring	15	30 %	21	42 %	36	72%
2	Sleep disorder	9	18 %	9	18 %	18	36%
3	Hyperglycemia	7	14 %	14	28 %	21	42%
4	Hypercholestremia	5	10 %	15	30 %	20	40%
5	High triglyceride	13	26 %	22	44 %	35	70%
6	High LDL	2	4%	11	22 %	13	26%
7	Low HDL	3	6%	7	14 %	10	20%
8	High blood pressure	6	12 %	5	10 %	11	22%
9	High liver enzymes	6	12 %	7	14 %	13	26%
10	Polycystic ovaries			1	2%	1	2%
11	Precocious puberty			1	2%	1	2%
13	Gynecomastia	1	2%			1	2%

Table.12.Causes of obesity in the patients

	Causes of obesity	Total Number	Female	% of female	male	% of male	Total number	Total %
1	Increase appetite &junk food intake	44	31	62%	13	26%	44	88%
2	Family history of obesity	41	29	58%	12	24%	41	82%
3	Sedentary life style	38	25	50%	13	26%	38	76%
4	Hormonal disease	8	6	12%	2	4%	8	16%
5	Psychological trauma	4	1	2%	3	6%	4	8%
6	Drug history	3	2	4%	1	2%	3	6%
7	Head trauma	2	____	___	2	4%	2	4%

*-Hormonal disease- 1 cushing syndrome, 1 polycystic ovary, 6 hypothyroidisim.

*-Drug history- 4 steroid therapy

Discussion: Current study shows that obesity has a significant gender association, the female: male ratio is more than 2:1, the same found by M. Badran (5). The explanation is because in our society we keep our female children and adolescents in door most of the time, which means less activity and more sedentary life style.

- 74% of our patients had normal height in contrary to William H.Dietz study found that most of obese children tend to be taller than their non obese pears, this may be because we use the height centile charts designed for American society. (6)

- only 16% of patients have BMI more than 95th percentile while 84% of them were severely obese (their BMI >99 percentile), un like the study of Josef A.Skelton that showed only 3.8% of obese children and adolescents had BMI>99 percentile in USA (7), this could be explained by the neglection or the unawareness of their families to the harm of obesity and its co morbidities on their children until it becomes so obvious and sever.

- All patients had waist circumference >90 percentile because most of them have BMI near to or > 99 percentile. This makes them more likely to have multiple risk factors (8)

- 22% of all patients had high blood pressure, 20% were adolescents, and boys were more than girls, this percentage is double the result in the study of Jonathan M.Sorof, who found that only 11% of children with BMI >95 percentile will have high blood pressure (9). This could explained by the high BMI of most

Patients, why boys are more affected? This could be due to sex hormone progesterone which protects girls from hypertension.

-72%of our patients have snoring during sleep and 36% have sleep disorder, this is also double the result of Craig Canopari study (10). More than 85% of them are adolescent boys, again this could be explained by the very high BMI of our patients, particularly the adolescent boys.

-42%of patients have hyperglycemia,40% hypercholestremia, 70% have high S.triglyceride and there is no significant association with gender or age groups unlike N.F.Chu study (11) how found hyperglycemia more in boys and high lipid profile in girls

- 26% of patients have high liver enzymes, similar to Aderiana Fran study (12), although she found the percentage of liver involvement by ultrsonography was higher than enzymes assay.
- Increase appetite(88%), family history of obesity(82%), and sedentary life style(76%) were the most common causes of obesity in our patients, same as in literature of the American Academy of child and adolescent psychiatry (13). this can be linked to shared family behaviors such as the un healthy eating habits. Endocrine diseases and drug history were rare causes.

Conclusion:

* Children and adolescents are equally susceptible to obesity, but girls are two times more than boys prone to be obese.

* Most of families not aware to the hazards of obesity on their children so they don't seek advice in early overweight or early obesity, that's why children and adolescents are at higher risk to have co morbidities.

* Most of obese children and adolescents particularly boys have sleep disorder so they are at high risk of cardio vascular diseases.

* Adolescents are at higher risk to hypertension, boys are slightly at higher risk than girls.

* Nearly 50% of the patients have high blood sugar, high cholesterol and high triglyceride level.

* Liver affected by obesity in about 26% or may be more since we didn't do ultrasonography to be sure.

* Increase appetite and junk food consumption, sedentary life style and family history of obesity are the most common causes of obesity in children and adolescents.

Recommendations:

1- At an individual level ; limit energy intake from fat and sugar, and increase consumption of fruits,vegetables,whole grains, nuts.

2-Families must be educated about the hazards and the risks that associate obesity in children and adolescents.

4-Consideration must be given to family behavior pattern for healthy life style pattern including healthy eating, and physical activities.

5-Schools play a particularly critical role by establishing a safe and supportive environment with policies and practices that support healthy behavior.

6-Social media must participates in society heath education regarding obesity in children

7-The government must takes its role in fighting obesity through the ministry of health by opening obesity therapy centers with well trained personnel.

References:

1- Christopher J.L. Murray; Nearly one third of the worlds population is obese or over weight, New data show. IHME.

2- WHO Media centre. obesity and over weight fact sheet N 311.up dated January 2015.

3- Wiliam Jklish, MD. Co morbidities and disease of obesity in children and adolescents.

4- Bethesda,MD; What are over weight and obesity.National institute of health.Diseases and conditions index.

5- Mohammad Badran and Ismail Taher; Obesity in Arabic- speaking countries. Jornal of obesity volume 2011, Article D686430,Page 9.

6- William H. Dietz. Health consequences of obesity in youth; child hood predictors of Adult Diseases.

7- Josef A.skelton. Prevalence and trends of sever obesity among children and adolescents; Department of pediatric, Wake forest university.school of medicine, Winston-salem.

8- Claudio Maffeis MD; Waist circumference and cardio vascular risk factor in prepubertal children. Obesity volume 9. Issue 3, pages 179-187. March 2001.

9- Jonathan M. Sorof, Over weight, Ethnicity and prevalence of hypertension in school aged children. Gate way. March 2004, volume 113/issue3.

10- Craig canapari ; Snoring in the obese child . April 5,2012.

11-N.F.Chu, E B Rimm, DJ Wang; The Taipei children heart study.The American society for clinical nutrition, Inc.

12- ADRIANA FRAN; Liver involvement in obese children ultrasonography and liver enzyme levels at diagnosis and during follow up in an Italian pop, Digestive diseases and sciences vol,42.No.7, July 1997.

13- American Academy of child and adolescent Psychiatry; Obesity in children and Teens.2015.