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Assessment of Overweight and Obesity among preschool children in day care centers in Alexandria - Egypt

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Abstract: **Background: Childhood obesity represents one of the most important and challenging public health problems that contribute to severe complications from childhood through adulthood. Aim: The study aimed to assess overweight and obesity among preschool children in day care centers in Alexandria. Study design: A cross-sectional descriptive comparative design was used to carry out this study. Study setting: the study was carried out in 20 private and nongovernmental organizations' day care centers affiliated to the Ministry of Social Solidarity in Alexandria; they represented 10% of total day care centers in the two selected zones namely; El- Montazah (143) and Middle zone (66). Study tools: three tools were used to collect the necessary data; World Health Organization (WHO) 2006 new international child growth charts (weight for height), children's profile structured interview schedule, 24 hours diet recall interview schedule for mothers .Study subjects: All obese and overweight children in the selected day care centers (252 children) were identified to represent group (A) in the study. A matching sample of normal body weight children (252 children) was selected randomly to represent group (B) for comparison, (total= 504 children). Results: The findings of the present study revealed that the prevalence of overweight and obesity among studied preschool children were 22% and 10% respectively. Several factors such as birth order, feeding pattern, energy intake and physical activity were associated with overweight and obesity. Conclusion: overweight and obesity were prevalent among preschoolers in day care centers in Alexandria city. Dietary habits and physical activity are of great importance of devolving these problems. Parents of overweight or obese children underestimated their child's weight status. Recommendation: routine screening for overweight and obesity of the children in day care centers through periodic anthropometric measurements and increase awareness about prevention of childhood obesity.**

Keywords: **Childhood obesity, Overweight, day care center, preschoolers.**

1. INTRODUCTION

Obesity is a major public health problem worldwide in the 21st century owing to its high prevalence and consequential morbidity and mortality; it affects all age groups including very young children and preschoolers (Mazur et al., 2013). Obesity is a condition of excess body fat often associated with a large number of devastating and life-threatening disorders. The excess generally arises from a sustained energy imbalance when energy intake through eating and drinking is more than energy expended through physical activity (Sahoo et al., 2015). The rise in childhood obesity over the past decade has been dramatic (WHO, 2018). Worldwide, at least one in every ten children under five years is overweight (Kambondo & Sartorius, 2018).According to new estimates in 2018, globally 38.3 million children under 5 were

overweight or obese which represents 5.6 percent in 2017 with an increase of 8 million since 2000; most sub regions show an upward trend (WFP & WHO, 2017).

Continue, the number of overweight or obese children under five years will increase to 70 million by 2025 (WHO, 2017 a). The vast majority of overweight or obese children live in developing countries, where the rate of increase has been more than 30% higher than that of developed countries (WHO, 2017 a). The rapid increase in overweight and obesity in developing countries is being aggravated by reduced physical activity and diets rich in refined grains, caloric sweeteners, and processed foods (Jones, Acharya & Galway, 2016). This nutrition and physical activity transition are mostly being experienced in urban settings (Kambondo & Sartorius, 2018). According to the report of UNICEF 2017, overweight in under five age children is an emerging concern in Egypt, increasing rates of overweight and obesity in children & adolescents signal a very alarming trend.

The percentage of overweight among under-five years children in both genders during 2014; was 15% of all children in this age group, while gender specific prevalence was; males 15.3% and females 14.3%, and by location the percentage was; urban 16.1% and rural 14.3%. Finally, by wealth quintile it was; Poorest 15.6% and Richest 17.7% (UNICEF, 2017). This percent has slightly increased to 16% in 2016 according to Egyptian demographic health survey (MOHP, El-Zanaty and Associates, ICF International, 2014 a; UNICEF, 2017). Although there is a genetic component to obesity, many modifiable risk factors are associated with overweight and obesity in children and youth. These include high birth weight, and, consumption of sugar-sweetened beverages, physical inactivity, sedentary behavior and inadequate sleep. Additionally, there are factors that have shown to be protective against child and youth overweight and obesity, such as breastfeeding, breakfast consumption and physical activity (Ontario Agency for Health Protection and Promotion, 2013). Childhood obesity can adversely affect nearly everybody system and often has serious physical consequences, including hypertension, dyslipidemia, insulin resistance, prediabetes, type 2 diabetes mellitus (type II DM), fatty liver diseases and psychosocial complications such as low self-stem (Nicolai, Lupiani & Wolf, 2012).

Overweight/obesity contributed to four million deaths and 120 million disability-adjusted life-years worldwide among under five age children in the year 2015 (The GBD Obesity Collaborators, 2017 Prevention of childhood obesity is a priority issue among public health professionals, health care providers, and parents and other caregivers (Skinner & Skelton, 2014). Strategies for reducing obesity have been explored and these include but not limited to; limiting unhealthy foods (refined grains and sweets, potatoes, red meat, processed meat) and beverages (sugary drinks), increase availability of healthier food in public service places, beside increasing physical activity, limiting screen time, , improving sleep pattern, healthy habits during pregnancy (Harvard University, 2015). Nurses in community-based or public health settings may be the best-positioned healthcare professionals to take action on the promotion strategies aimed at the prevention and treatment of childhood obesity.

They are likely to have an influence in the development of programs and/or policies that impact childhood obesity prevention, community health nurses will need to assess the level and type of prevention most suitable for the child, family, culture, socio- economic status and environment (Rhee et al., 2018). Reducing level of childhood obesity is an enormous task. Nurse can promote healthy lifestyle patterns that reduce risk of childhood obesity. Encouraging breast feeding, physical activity, regular meals as well nutrition and weight counseling are all areas where nurses may contribute to reduce risk of obesity in children and adolescents (Skelton, 2015). Childhood care settings play an important role in children's development and provide a valuable support to families with preschool children. Considering the high number of preschool-age children in the childcare centers in both developed and developing countries and the long period of time children spend in childcare during early years of development, it is important to explore how childcare environment may be conducive to, or protective against, the development of childhood obesity (Swyden et al., 2017).

Aims of the study

The study aimed to:

-Assess overweight and obesity among preschool children in day care centers in Alexandria.

Research questions:

1. What is the prevalence of overweight and obesity among preschool children in day care centers in Alexandria?
2. What are the contributing factors of overweight and obesity among preschool children in day care centers in Alexandria?

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2. SUBJECTS AND METHODS

Research design:

A cross-sectional descriptive comparative design was used to carry out this study.

Study setting:

The study was carried out in 20 private and nongovernmental organizations' day care centers under the umbrella of the Ministry of Social Solidarity in Alexandria. By using multistage sampling technique:-

- Two zones out of the seven zones affiliated to Ministry of Social Solidarity (excluding Borg EL-Arab as it has no affiliated day care centers) were selected based on the largest number of day care centers available. Those zones were: El- Montazah and Middle zones.
- 10% of day care centers in each selected zone were chosen to carry out the study.
- The private and nongovernmental organizations' day care centers from each zone were allocated proportionally by using the following formula:

$$n_i = \frac{n * N_i}{N}$$

Where:

- n_i = the required number of private or nongovernmental organizations' day care centers from each selected zone.
- n = the total number of private and nongovernmental organizations' day care centers that will be taken from each selected zone.
- Ni = the total number of private or nongovernmental organizations' day care centers in each selected zone.
- N = the total number of all private and nongovernmental organizations' day care centers in each selected zone.

The total number of the private and nongovernmental organizations' day care centers that were included in the study was **twenty-**day care centers**.**

Study subjects:

- All children aged 3-5 years in the previously selected day care centers **(796 children)** were assessed by measuring weight and height to evaluate their nutritional status (wasted, normal, overweight, obese).
- All obese and overweight children in the selected day care centers **(252 children)** were identified to represent group (A) in the study.
- A matching sample of normal body weight children **(252 children)** was selected randomly to represent group (B) for comparison.

Tools of data collection:

In order to collect the required data for the study, the following tools were used.

Tool I: Children nutritional status assessment tool: World Health Organization (WHO) 2006 new international child growth standard was used by the researcher to assess the nutritional status of the preschool children; weight for height against age was used as indicator to identify nutritional status of the children**.**

Tool II: Children's profile structured interview schedule: It was developed by the researchers after reviewing relevant literature to collect the required data from the parents of both groups (A and B), it included three parts: **Part 1: Socio-demographic characteristics of the children as** child's age, sex, birth order**.**, **Part II:** Child's life style as nutritional and eating habits, physical activity, sleeping pattern and child's screen time and **Part III**: Health profile of the children as (Past & present health history) Family history of diabetes, thyroid problems and overweight/ obesity.

Tool III: 24 hours diet recall structured interview schedule.

It was developed by the researchers to collect the required data from the mothers for both groups (A and B). It contained food recall of dietary intake over the past 24 – hours and food habits.

Methods

Administrative process:

-Official letters from the Faculty of Nursing, Alexandria University were directed to the undersecretary of the Ministry of Social Solidarity in Alexandria to inform them about the study objectives and to take their permission to conduct the study in the selected day care centers affiliated to this ministry.

-Official letters were directed from undersecretary of the Ministry of Social Solidarity to the national security in Alexandria to take their permission to conduct the study in the selected day care centers.

Content validity:

-Tools II, III were developed by the researchers after thorough extensive reviewing of the relevant and recent literature.

-The tools II, III were subjected to a jury composed of seven experts in the field of community health, pediatrics and nutrition for content validity, their opinions and suggestions were taken into consideration. Then recommended modifications were done accordingly.

-Cronbach's Alpha reliability test was conducted for tools II, III and the correlation coefficient was found r = 0.750 for tool II and r = 781 for tool III.

Pilot study:

- A pilot study was carried out on all children (28 children) who were found in the day care center (affiliated to the middle zone) namely Sindbad (not included in the study sample). Equal number of overweight & obese and normal children was taken in the pilot study, in order to ascertain the relevance, clarity, and applicability of the tools, test wording of the questions and estimate the time required for filling the questionnaire. Based on the obtained results, the necessary modifications were done.

Fieldwork:

- Data were collected by the researchers from September 2017 to January 2018

- Anthropometric measurements: Weight and height were measured by the researchers for all children in each day care center in the first contact with the children.

- These measurements were plotted on the WHO weight / height growth chart for boys and girls, then the nutritional status of the studied children was identified as follows.

Overweight is weight-for-height greater than 2 standard deviations above WHO Child Growth Standards median

Obesity is weight-for-height greater than 3 standard deviations above the WHO Child Growth Standards median

- Identified overweight and obese children represented group A and normal weight children represented group B. Wasted children were excluded from the study after reporting the day care centers' supervisors about their nutritional status for referral.

- The data was collected individually from the children' mothers in selected day care centers after agreement on suitable appointment with them using tool II.

- The structured interview took approximately from 45 to 60 minutes for each mother to complete data for tool II and from 20 to 30 minutes for tool III.

Statistical analysis:

- The data of tool III was analyzed and the nutritive value of the daily intake of energy, macronutrients was computed using Egyptian Food Composition tables of the National Nutrition Institute. (National Nutrition Institute, 2006)

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- The collected data were coded and analyzed using PC with the International Business Machine- Statistical Package for Social Sciences (IBM-SPSS version 20) and tabulated frequency and percentages were calculated.
- Fissure's exact test (FET): it was used whenever 20% or more of the table cells have expected cell frequencies <5
- T- Test (t): it was used to compare means of two samples.
- The level of significance selected for this study was p-value equal to or less than 0.05.
- Bivariate logistic regression was carried out to identify associated factors with childhood overweight and obesity

Ethical considerations

- Informed oral and written consent was obtained from every participant included in the study after explanation of the aim of the study and assured them that collected data would be used only for the study purpose, and their participation in the study was voluntary and they could withdraw at any time .
- Confidentiality and anonymity of individual's response was ensured by using a code number instead of names.

3. RESULTS

Figure (1) Illustrates distribution of all studied preschool Children according to their nutritional status. Concerning weight – height of all children in day care centers, the figure shows that more than half (54%) of children had normal weight – height, while less than one quarter (22%) of them were overweight. Those who were wasted & obese constituted (14% and 10% respectively).

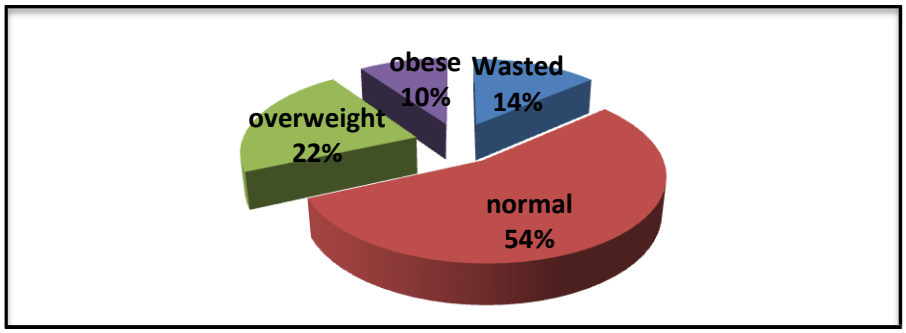

Figure (1): Distribution of all preschool Children according to their nutritional status (n= 796)

Table (1) illustrates the distribution of the studied preschool children according to their anthropometric measurements. Around three quarters (74.8%) of the children their birth weight ranged from 2.5 to 4 Kg, whereas slightly more than one tenth of them their birth weight were either less than 2.5 Kg or more than 4Kg (13.1% and 12.1% respectively). The same table reveals that half (50%) of the children had normal weight-height, while slightly more than one third (34.7%) of them were overweight & those who were obese constituted 15.3% of the sample.

Table (1): Distribution of the studied preschool children according to their anthropometric measurements

Anthropometric measurements	Total = 504	
	No.	%
Birth weight (Kg)		
< 2.5	66	13.1
2.5 – 4	377	74.8
> 4	61	12.1
Min-Max	**0.5 – 5**	
Mean ± SD	**3.18 ±0.84**	
Weight- for- Height		
Normal	252	50
Overweight	175	34.7
Obese	77	15.3

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Table (2). The table depicts that there was a statistically significant relation between mothers' work and their children's weight (X^2=5.36, P=0.021). More than half (53.9%) of children who had non - working mothers were overweight or obese compared to 46.1% of children with normal weights. The table also illustrates that there was a statistically significant relation between children's socioeconomic level and their weight (X^2=10.41, P=0.006). More than half (57.3%) of children with high socioeconomic level were overweight or obese compared to more than two fifths (42.7%) of those with normal weights.

Table (2): Relationship between the preschool children socio-demographic characteristics and their weight.

Socio-demographic characteristics	Weight - height categories						Test of significance
	Normal (N=252)		Overweight & obese (N= 252)		Total (N= 504)		
	No	%	No	%	No	%	
Age (years)							
3 -	61	50.4	60	49.6	121	24	X^2= 2.653
4 -	122	53.3	107	46.7	229	45.4	P= 0.265
5	69	44.8	85	55.2	154	30.6	
Birth order							
First	77	49	80	51	157	31.2	
Second	75	44.6	93	55.4	168	33.3	X^2=6.926
Third	65	52	60	48	125	24.8	P=0.074
Fourth and more	35	64.8	19	35.2	54	10.7	
Fathers' age							
< 30	7	63.6	4	36.4	11	2.2	
30-	130	51.2	124	48.8	254	50.4	X^2=1.447
40-	99	46.9	112	53.1	211	41.9	P=0.694
50- less than 60	16	57.1	12	42.9	28	5.6	
Fathers' education							
Illiterate/read & write	16	57.1	12	42.9	28	5.6	
Primary education	14	58.3	10	41.7	24	4.8	X^2=1.783
Preparatory education	16	51.6	15	48.4	31	6.2	P=0.776
Secondary education	88	50.6	86	49.4	174	34.5	
University or higher education	118	47.8	129	52.2	247	49	
Fathers' work							
Working	245	49.7	248	50.3	493	97.8	X^2= 0.836
Not working	7	63.6	4	36.4	11	2.2	P= 0.360
Mothers' age							
20-	27	75	9	25	36	7.1	
25-	55	53.9	47	46.1	102	20.2	X^2=13.49
30-	88	43.1	116	56.9	204	40.5	P=0.004*
35 – less than 50	82	50.6	80	49.4	162	32.1	
Mothers' education							
Illiterate/read & write	32	60.4	21	39.6	53	10.5	
Primary education	12	46.2	14	53.8	26	5.2	X^2=3.786
Preparatory education	20	48.8	21	51.2	41	8.1	P= 0.436
Secondary education	86	52.1	79	47.9	165	32.7	
University or higher education	102	46.6	117	53.4	219	43.5	
Mothers' work							
Working	104	56.8	79	43.2	183	36.3	X^2=5.36
Non-working	148	46.1	173	53.9	321	63.7	P=0.021*
Place of residence							
Urban	130	49.4	133	50.6	263	52.2	X^2= 0.072
Squatter	122	50.6	119	49.4	241	47.8	P= 0.789
Family income							
Enough	176	46.6	202	53.4	378	75	X^2=7.153
Not enough	76	60.3	50	39.7	126	25	P=0.008*

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Crowding index							
< 2	63	53.8	54	46.2	117	23.2	X^2=7.365 P=0.025*
2	124	44.8	153	55.2	277	55	
≥3	65	59.1	45	40.9	110	21.8	
Socio economic level							
High	90	42.7	121	57.3	211	41.9	X^2=10.41 P=0.006*
Middle	128	53.1	113	46.9	241	47.8	
Low	34	65.4	18	34.6	52	10.3	

X^2 Chi Square test P = statistically significant at ≤ 0.05

Table (3) portrays that the overweight and obesity were more prevalent among the children who were bottle fed only and those who were breast and bottle fed (65.1% and 63.3% respectively) than among children who were breast fed only (40.3%). There was significant difference between feeding pattern and children's weight (X^2=27.68, P=0.000). As for breast feeding duration, the highest percentage (80%) of overweight and obese children were among children who were breast fed for 6 to less than 12 months . Significant difference was noticed between duration of breast feeding and children's weight (X^2=12.07, P=0.017).

Table (3): Relationship between the studied preschool children feeding pattern during infancy period and their weight

Feeding pattern	**Weight - height categories**						**Test of significance**
	Normal (N=252)		**Overweight & obese (N= 252)**		**Total (N= 504)**		
	No	**%**	**No**	**%**	**No**	**%**	
Feeding pattern							
- Breast feeding	178	59.7	120	40.3	298	59.1	X^2=27.68 P=0.000*
- Bottle feeding	30	34.9	56	65.1	86	17.1	
- Both	44	36.7	76	63.3	120	23.8	
Breast feeding duration (months)	**N=222**		**N=196**		**N=418**		
- < 6	4	28.6	10	71.4	14	3.3	X^2=12.07 P=0.017*
- 6-	2	20	8	80	10	2.4	
- 12-	60	57.7	44	42.3	104	24.9	
- 18-	107	57.8	78	42.2	185	44.3	
- ≥24	49	46.7	56	53.3	105	25.1	
Bottle feeding duration (months)	**N=74**		**N=132**		**N=206**		
- < 6	11	61.1	7	38.9	18	8.7	X^2=10.03 P=0.039*
- 6-	7	33.3	14	66.7	21	10.2	
- 12-	24	44.4	30	55.6	54	26.2	
- 18-	19	33.9	37	66.1	56	27.2	
- ≥24	13	22.8	44	77.2	57	27.7	

X^2 Chi Square test P = Statistically significant at ≤ 0.05

Table (4) The table reveals that there was a significant relation between practicing exercises and children's weight (X^2= 23.15, P= 0.000). Overweight and obesity were more prevalent among children who were not practicing exercises (57.6%). It is worth mentioning that the majority (85.7%) of hypoactive children at home were overweight or obese. Statistically significant difference was observed between activity level at home and children's weight (X^2=49.74, P=0.000). Additionally, just more than two thirds (66.7%) of children using motor vehicles to go to day care center were overweight or obese. Statistically significant difference was found between transportation means to go to day care center and children's weight (X^2=15.72, P=0.000).

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Table (4): Relationship between practicing physical activities and preschool children's weight.

Physical activities	Weight - height categories						Test of significance
	Normal (N=252)		Overweight & o (N= 252)		Total (N= 504)		
	No	%	No	%	No	%	
Practicing exercises							
- Yes	11	65.1	59	34.9	169	33.5	X^2= 23.15
- No	14	42.4	193	57.6	335	66.5	P= 0.000*
Frequency of exercises	N= 110		N=59		N=169		
- Once/week	17	81	4	19	21	12.4	X^2=3.785
- Twice/week	51	59.3	35	40.7	86	50.9	P=0.151
- ≥Three times/week	42	67.7	20	32.3	62	36.7	
Level of home activity	N= 252		N=252		N=504		
- Hypoactive	11	14.3	66	85.7	77	15.3	X^2=49.74
- Normoactive	90	51.1	86	48.9	176	34.9	P=0.000*
- Hyperactive	15	60.2	100	39.8	251	49.8	
Outside home activities							
- Yes	20	52.6	185	47.4	390	77.4	X^2=4.534
- No	47	41.2	67	58.8	114	22.6	P=0.033*
Going to day care center							
- Walking	21	54.5	180	45.5	396	78.8	X^2=15.72
- Motor vehicle	36	33.3	72	66.7	108	21.2	P=0.000*
Walking duration to day care center	N= 216		N=180		N=396		
- 5-	68	39.1	106	60.9	174	43.8	
- 15-	81	60	54	40	135	34	X^2=43.18
- 25-	43	68.3	20	31.7	63	15.9	P=0.000*
- 35- 45	24	100	0	0	24	6	

X^2 Chi Square test P = Statistically significant at ≤ 0.05

Table (5) portrays that statistically significant difference was observed between the daily hours of watching T.V and children's weight (X^2=91.68, P=0.000). It is found that more than half (55.1%) of children using smart phones and computers were overweight or obese compared to 44.9% of those with normal weights. A significant difference was observed between using smart phones & computers and children's weight (X^2=9.343, P=0.002). Statistically significant difference was ascertained between daily hours of using smart phones and computers and children's weight (X^2=22.65, P=0.000).

Table (5): Relationships between the studied preschool children screen time and their weight.

Screen time	Weight - height categories						Test of significance
	Normal (N=252)		Overweight & obese (N= 252)		Total (N= 504)		
	No	%	No	%	No	%	
Watching TV							
- Yes	235	49.9	236	50.1	471	93.5	X^2= 0.032
- No	17	51.5	16	48.5	33	6.5	P= 0.857
Daily use	N= 235		N=236		N=471		
- < 1/ hour	49	74.2	17	25.8	66	14	
- 1-	152	63.6	87	36.4	239	50.7	X^2=91.68
- 3-	28	22.2	98	77.8	126	26.8	P=0.000*
- ≥5	6	15	34	85	40	8.5	

Use of smart phones and computers	N= 252		N=252		N=504		
- Yes	144	44.9	177	55.1	321	63.7	X^2=9.343
- No	108	59	75	41	183	36.3	P=0.002*
Daily use	**N= 144**		**N=177**		**N=321**		
- < 1/ hour	36	55.4	29	44.6	65	20.2	
- 1-	85	52.5	77	47.5	162	50	X^2=22.65
- 3-	20	25.3	59	74.7	79	24.6	P=0.000*
- ≥5	3	20	12	80	15	4.7	

Table (6) presents that more than half (59.4%) of children who were sleeping six to less than eight hours at night were overweight or obese compared to around two fifths (40.6%) of normal weights children. Significant difference was found between night sleeping hours and children's weight (X^2= 3.165, P= 0.020).There was also significant relation between total daily sleeping hours and children's weight (X^2=7.962, P=0.019).Significant difference was found between sleeping problems and children's weight (X^2=36.18, P=0.000). Hypersomnia was common among 84.6% of overweight and obese children, compared to 15.4% of normal weights ones.

Table (6): Relationships between the studied preschool children's sleeping pattern and their weight.

Sleeping pattern	Weight - height categories						Test of significance
	Normal (N=252)		Overweight & obese (N= 252)		Total (N= 504)		
	No	%	No	%	No	%	
Night sleeping hours							
- <8	13	40.6	21	59.4	34	6.7	X^2= 3.165
- 8-	110	53.7	95	46.3	205	40.7	P= 0.020*
- ≥10	129	48.7	136	51.3	265	52.6	
Taking naps							
- Yes	110	44.7	136	55.3	246	48.8	X^2=5.368
- No	142	55	116	45	258	51.2	P=0.020*
Total daily sleeping hours	**N= 252**		**N=252**		**N=504**		
- <10	62	49.6	63	50.4	125	24.8	X^2=7.962
- 10-12	180	52.5	163	47.5	343	68.1	P=0.019*
- >12	10	27.8	26	72.2	36	7.1	
Sleeping after meals							
- Yes	83	33.7	163	66.3	246	48.8	X^2=50.82
- No	169	65.5	89	34.5	258	51.2	P=0.000*
Sleeping problems							
- Yes	88	41.1	126	58.9	214	42.5	X^2=11.73
- No	164	56.6	126	43.4	290	57.5	P=0.001*
Sleeping problems type	**N= 88**		**N=126**		**N=214**		
- Hypersomnia	6	15.4	33	84.6	39	18.2	
- Insomnia	45	63.4	26	36.6	71	33.2	X^2=36.18
- Interrupted sleep	18	25.4	53	74.6	71	33.2	P=0.000*
- Insufficient sleep	19	57.6	14	42.4	33	15.4	

X^2: Chi-square test P: P value of chi-square test *significant at P value<0.05

Table (7) reveals that a significant difference was ascertained between the type of health problems and children's weight (X^2=59.629, P=0.000) as the table depicts that all children suffering from hypothyroidism were overweight or obese. Furthermore, more than three quarters (77.8%) of children suffering from musculoskeletal problems were overweight or obese compared to 22.2% of those with normal weights.

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Table (7): Relationship between the studied preschool children health status and their weight.

Health status	Weight - height categories						Test of significance
	Normal (N=252)		Overweight & obese (N= 252)		Total (N= 504)		
	No	%	No	%	No	%	
Current health problems							
- Yes	163	51.7	152	48.3	315	62.5	X^2=1.024
- No	89	47.1	100	52.9	189	37.5	P=0.311
Types of current problems#	**N= 163**		**N=152**		**N=315**		
- Bronchial asthma	26	47.3	29	52.7	55	17.5	
- Anemia	26	40	39	60	65	20.6	
- Hypothyroidism	0	0	9	100	9	2.9	
- GIT disorders	31	47.7	34	52.3	65	20.6	X^2= 59.629
- Allergy	27	64.3	15	35.7	42	13.3	P= 0.000*
- Urology disorders	10	50	10	50	20	6.3	
- Musculoskeletal disorders	6	22.2	21	77.8	27	8.6	
- Others	47	66.2	24	33.8	71	22.5	
Have parasitic diseases							
- Yes	139	57.7	102	42.3	241	47.8	X^2=10.88
- No	113	43	150	57	263	52.2	P=0.001*
Child's appetite with parasitic diseases	**N= 139**		**N=102**		**N=241**		
- No effect	64	57.7	47	42.3	111	46.1	X^2=9.714
- Decreased	48	70.6	20	29.4	68	28.2	P=0.008*
- Increased	27	43.5	35	56.5	62	25.7	
Current medications							
- Yes	102	45.5	122	55.5	224	44.4	X^2=3.214
- No	150	53.6	130	46.4	280	55.6	P=0.073

X^2: Chi-square test P value of chi-square test *significant at P value<0.05

Table (8) clarifies that there was a statistically significant difference between the number of daily meals and the children's weight (X^2= 50.95, P= 0.000). As for taking snacks, the table shows that more than half (52.9%) of overweight and obese were among children who were taking snacks, compared to 47.1% of normal weights children. Significant difference was found between taking snacks and children's weight (X^2= 12.43, P= 0.000). The table also reveals that there was significant relation between eating fast food and children's weight (X^2=31.72, P=0.000). The highest percentage (63.6%) of overweight and obese was found among the children who eating fast food. It is also worth mentioning that overweight and obesity were more prevalent among children who eating during watching T.V or using computer (58.8%), compared to 41.2% of those with normal weights. As regards to intake of soda, overweight and obesity were more prevalent among children who were drinking soda daily.

Table (8): Relationship between the studied preschool children dietary habits and their weight

Dietary habits	Weight - height categories						Test of significance
	Normal (N=252)		Overweight & obese (N= 252)		Total (N= 504)		
	No	%	No	%	No	%	
Number of daily meals							
- ≤ 2	111	68.5	51	31.5	162	32.1	X^2= 50.95
- 3	138	45.2	167	54.8	305	60.5	P= 0.000*
- > 3	3	8.1	34	91.9	37	7.3	

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Taking snacks							
- Yes	208	47.1	234	52.9	442	87.7	X^2= 12.43
- No	44	71	18	29	62	12.3	P= 0.000*
Types of snacks#	**N=208**		**N=234**		**N=442**		
- Chips	50	39.7	76	60.3	126	28.5	
- Biscuits and sweets	45	43.3	59	56.7	104	23.5	
- Fruits and vegetables	61	61.6	38	38.4	99	22.4	X^2= 42.116
- Fresh juices	34	61.8	21	38.2	55	12.4	P= 0.000*
- Soft / canned drinks	16	23.9	51	76.1	67	15.2	
- Sandwiches	65	55.1	53	44.9	118	26.7	
Number of daily snacks							
- One	102	70.3	43	29.7	145	32.8	X^2=60.78
- Two	63	47.7	69	52.3	132	29.9	P=0.000*
- Three and more	43	26.1	122	73.9	165	37.3	
Regular time of daily meals	**N=252**		**N=252**		**N=504**		
- Yes	162	59.8	109	40.2	271	53.8	X^2=22.42
- No	90	38.6	143	61.4	233	46.2	P=0.000*
Child's intake of breakfast							
- No	6	35.3	11	64.7	17	3.4	
- Seldom	19	46.3	22	53.7	41	8.1	X^2=4.774
- Sometimes	55	44.4	69	55.6	124	24.6	P=0.189
- Daily	172	53.4	150	46.6	322	63.9	
Eating fast food	**N= 252**		**N=252**		**N=504**		
- Yes	84	36.4	147	63.6	231	45.8	X^2=31.72
- No	168	61.5	105	38.5	273	54.2	P=0.000*
Frequency of fast food	**N= 84**		**N=147**		**N=231**		
- Once/two months	28	45.9	33	54.1	61	26.4	
- Twice/month	6	37.5	10	62.5	16	6.9	X^2= 12.859
- Once /week	23	42.6	31	57.4	54	23.4	P= .012 *
- Twice/week	19	38.8	30	61.2	49	21.2	
- Three& more / week	8	15.7	43	84.3	51	22.1	
Nutritional pattern							
Have food during watching TV or using computer							
- Yes	129	41.2	184	58.8	313	62.1	X^2=25.50
- No	123	64.4	68	35.6	191	37.9	P=0.000*
Drinking soda							
- No	88	69.8	38	30.2	126	25	
- Seldom	88	60.3	58	39.7	146	29	X^2=62.38
- Sometimes	64	39	100	61	164	32.5	P=0.000*
- Daily	12	17.6	56	82.4	68	13.5	
Daily intake of soda / (Cups 200 ml)	**N= 12**		**N=56**		**N=68**		
- One /day	7	25.9	20	74.1	27	39.7	X^2=3.848
- Two/day	5	17.2	24	82.8	29	42.6	P=0.146
- Three and more/day	0	0	12	100	12	17.6	

X^2 Chi Square test P = Statistically significant at ≤ 0.05 # Multiple answers were allowed
FET: Fisher's Exact test

Table (9) illustrates that overweight and obese children had much energy intake than normal weight ones with a mean of 1912.98±561.61 and 1223.87±413.01kcal respectively. Statistically significant difference was observed between children's energy intake and their weight (t= -15.692, P= 0.000). Overweight and obese children had consumed much fat intake with a mean of 88.32±41. 31gram.With respect to CHO intake, the table also depicts that overweight and obese children daily consumption of CHO was very high with a mean of 254.16±85.26 gram. A statistically significant difference between children's CHO intake and their weight was observed (t= -10.778, P= 0.000). A statistically significant difference between children's sodium consumption and their weight (t= -12.227, P= 0.000).

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Table (9): Relationship between the studied preschool children nutrients 'intake and their weight.

Nutrients' intake	Weight - height categories			Test of significance
	Normal (N=252)	Overweight & obese (N= 252)	Total (N= 504)	
	Mean ± SD	Mean ± SD	Mean ± SD	
Energy (kcal)	1223.87±413.01	1912.98±561.61	1568.43±601.22	t= -15.692 P= 0.000*
Total protein (gram)	22.98±14.90	25.37±9.56	24.17 ±12.56	t= - 2.146 P= 0.032*
Total fat (gram)	45.60± 25.93	88.32±41.31	66.96 ±40.55	t= -13.902 P= 0.000*
CHO (gram)	180.08±68.24	254.16±85.26	217.09 ±85.60	t= -10.778 P= 0.000*
Fibers (gram)	5.91±6.36	5.47±3.63	5.69±5.18	t= 0.966 P= 0.335
Sodium(mg)	1144.19±528.88	1884.25±802.12	1514.22±773.19	t= -12.227 P= 0.000*
Total iron(mg)	6.99±2.71	9.97±3.67	8.48 ±3.55	t= -10.360 P= 0.000*

X2 Chi Square test t independent samples T-test P = Statistically significant at ≤ 0.05

Table (10) illustrates that the percent density of fat intake that above acceptable range was (34.5%) for normal children and increased to (65.5%) for overweight or obese children,. Significant difference was found between fat percent density and children's weight (X^2=46.88, P= 0.000).Additionally, less than three quarters (70.5%) of children whose CHO percent density below acceptable range were overweight or obese compared to more than one quarter (29.5%) of those with normal weight. There was statistically significant difference between CHO percent density and children's weight (X^2=21.13, P= 0.000).

Table (10): Relationship between the studied preschool children macronutrients' density and their weight

Macronutrients' density	Weight - height categories						Test of significance
	Normal (N=252)		Overweight & obese (N= 252)		Total (N= 504)		
	No	%	No	%	No	%	
Total protein density							
- Below acceptable range	142	42.6	191	57.4	333	66.1	X^2=21.76 P= 0.000*
- Within acceptable range	109	64.1	61	35.9	170	33.7	
- Above acceptable range	1	100	0	0	1	0.2	
Mean ±SD	8.29±4.85		5.97±3.32		7.13±4.31		t= 6.258 P= 0.000*
Total fat density							
- Below acceptable range	77	72.6	29	27.4	106	21	X^2=46.88 P= 0.000*
- Within acceptable range	96	56.8	73	43.2	169	33.5	
- Above acceptable range	79	34.5	150	65.5	229	45.4	
Mean ±SD	32.35±11.56		40.32±11.79		36.33 ±12.33		t= -7.660 P= 0.000*
CHO density							
- Below acceptable range	23	29.5	55	70.5	78	15.5	X^2=21.13 P= 0.000*
- Within acceptable range	149	50	149	50	298	59.1	
- Above acceptable range	80	62.5	48	37.5	128	25.4	
Mean ±SD	59.25±10.86		53.72±11.34		56.48 ±11.43		t= 5.597 P= 0.000*

X^2 Chi Square test t independent samples T-test P = Statistically significant at ≤ 0.05

Table (11) showed the risk factors associated with childhood overweight or obesity that included low educated fathers (β=58.624, P= 0.005), working father (β=85.572, P= 0.025), non - working mothers (β=1.539, P= 0.021), low crowding index (β=8.479, P=0.025), non-practicing exercises (β=2.534, P= 0.000), hypo activity at home (β=30.712, P= 0,007), using motor vehicle for going to day care center (β=2.480, P=0.000), long duration" 3-4 hours" of daily use of computers (β=16.847, P= 0.010), hypersomnia (β=7.464, P=0.000), no taking meals on regular basis (β= 2.361, P=0.000), high energy intake (β=1.003, P=0.000), high protein intake (β=1.017, P=0.040), high fat intake (β=1.039 , P=0.000), high CHO intake (β=1.013, P=0.000) and high sodium intake (β=1.002, P=0.000).

Table (11) clarifies binary logistic regression for factors affecting overweight and obesity in children:

Indicators of childhood obesity	p	Exp (B)	95% CI Exp (B)	
			LL	UL
Fathers' education (preparatory education "low educated")	0.005*	58.624	3.454	995.057
Fathers' work (yes)	0.025*	85.572	1.761	4158.159
Mothers' work (no)	0.021*	1.539	1.068	2.218
Family income (not enough)	0.008*	0.573	0.380	0.864
Crowding index (low "two members/ room")	0.025*	8.479	1.301	55.262
Socio economic level (low)	0.004*	0.394	0.209	0.742
Feeding pattern (breast feeding)	0.000*	0.390	0.252	0.605
Practicing exercises (no)	0.000*	2.534	1.727	3.718
Level of home activity (hypoactive)	0.007*	30.712	2.604	362.216
Going to day care center (motor vehicle)	0.000*	2.480	1.582	3.888
Daily use of T.V(short duration "<1 hour")	0.005*	0.068	0.010	0.453
Daily use (long duration" 3-4 hours")	0.010*	16.847	1.993	142.445
Sleeping problems (no)	0.001*	0.537	0.375	0.767
Regularity of taking meals (no)	0.000*	2.361	1.650	3.380
Fast food (no)	0.000*	0.357	0.249	0.513
Drinking soda (no)	0.018*	0.056	0.005	0.614
Energy intake (kcal) "high intake"	0.000*	1.003	1.002	1.003
Total fat intake (gram) "high intake"	0.000*	1.039	1.031	1.046
Total CHO intake (gram) "high intake"	0.000*	1.013	1.010	1.016
Sodium intake (gram) "high intake"	0.000*	1.002	1.001	1.002

Exp β: odds ratio CI: Confidence interval LL: Lower limit UL: Upper Limit

Exp β >1: Risk factors for childhood obesity Exp β <1: Protective factors for childhood obesity *: Statistically significant at $p \leq 0.05$

4. DISCUSSION

Egypt has had the biggest rise in overweight and obesity since 1980 and is one of 10 countries that account for more than half of the world's obesity problem in terms of absolute numbers affected (Ng et al., 2013). The findings of the current study revealed that about one third of the studied children were either overweight (22%) or obese (10%). The results of the current study come in line with the results of a study in Alagoas that found the prevalence of overweight and obesity were 23.9% and 7.8% respectively (Moreira, Cabral, Ferreira & De Lira, 2014). Indeed, mother's work seems to be the most significant influencing factor on the occurrence of overweight and obesity. It is evident from the results of the current study that Children of non - working mothers were more 1.539 times likely to be overweight or obese than their counterparts of working ones. An explanation of these findings could be attributed to that non- working mothers may have much more time than working ones that make them concerned to over-feed their children all over the day to be healthier from their incorrect perspective. in contrast results of present study, the findings drawn from study conducted by Felisbino-Mendes et al (2016) which demonstrated that working mothers showed higher significant prevalence of childhood obesity compared to non-working mothers. It may attribute to many reasons such as children of working mothers consuming more fast food that rich with fat and sugar as mothers have no time for preparing healthy meals. Moreover, mothers use fat and sugar rich food as sweets, cookies as rewards for her long absence in the work. The employment status of the mother was not significantly associated with childhood obesity which was reported by (Tchoubi

et al., 2015).The present study illustrates that more than half of children with high socioeconomic level were overweight or obese while, This correlation confirmed that children with low socioeconomic status were 0.394 times less likely to be overweight or obese than their counterparts with high or middle level. The observed positive association between socioeconomic status and preschool overweight/obesity in present study may be explained by the fact that children from affluent families may have higher access to energy-rich diets as well as more opportunities for eating fast food, and electronic games which putting them at a higher risk for positive energy balance and weight gain.

The findings of the present study come in line with other studies as Khashayar et al (2018) which revealed that the prevalence of childhood obesity trend to be higher in upper socioeconomic status group as compared to the middle or lower socioeconomic status group. Meanwhile, the results of the current study disagreed with study conducted by Kral et al (2017) which concluded that children from lower income households were much more likely to be obese compared with those from higher income households. Breastfeeding promotes healthier feeding pattern because it allows infants to control intake until satiety is reached. Another mechanism was bioactive factors in breast milk as it decreases appetite associated peptide as it contains leptin which is a hormone that regulates appetite and it also decreases secretion of ghrelin and result in reduced risk of obesity. In the light of this, the present study showed that breast feeding was a protective factor for overweight and obesity among the studied children. It is noticed from this study that breast fed children were less likely to be overweight or obese than bottle or mixed fed children. Similar findings were added by, Tester et al (2018) documented that having never been breastfed was associated with increased odds of obesity and higher odds of severe obesity.

The current study findings were in contrast with Géa-Horta et al (2016) who found that excess weight was seen in breastfed children. On the other side, some studies as Leng et al (2015) stated that breastfeeding and childhood obesity have a small or insignificant relationship. With respect to duration of breast feeding, it was observed that there was significant relation between duration of breast feeding and overweight & obesity as the highest percentages of overweight and obese children were breast fed for less than 6 months and from 6 to less than 11 months than those who were breast fed for longer duration (more than 12 months). This may be attributed to shorter duration of breastfeeding is probably associated with early introduction of solid food; containing more fat and carbohydrates than breast milk; and may induces a greater number of feeding times. Additionally, there has been a great weight of studies illustrated that longer breast feeding duration is a protective factor for overweight and obesity in young children such as Yan et al (2014) who cited that breast fed children had 22% lower risk for obesity compared to those who have never been breastfed. On the contrary, a study done by Hassan et al (2018) revealed that the highest percent of the overweight/ obese children were breastfed for more than 12 months (64.3% and 71.4% respectively), followed by those never breastfed (21.4% and 14.3%). The children's birth weight is considered another risk factor for overweight and obesity. The results of the current study indicated that overweight and obesity were more prevalent among children born with high birth weight (more than 4 kilograms) than with low or normal birth weight. These results were in parallel with Ikeda & Nishi (2019) they reported that increased birthweight and gestational length appeared to be primary factors that influenced overweight and obesity incidence in preschool years. Physical activity is a key component of healthy child development and prevention of disease.

Considerably, the present study declared that practicing exercise was inversely associated with overweight and obesity. As evident from the current study, children who were not practicing exercise were 2.534 times more to be overweight and obese. These results could be because doing physical exercise burns off body fat leads to less risk of overweight/obesity. The finding of the current study is concordant to Tahir et al (2019) who cited that low physical activity level versus high physical activity level at ages 3–5 years was associated with odds ratios of overweight/obesity and Li et al (2019) found that lower levels of moderate - vigorous physical activity or higher levels of sedentary time on either weekdays or weekend were associated with increased odds of obesity in children. Moreover, a study conducted by Hong et al (2016) confirmed that the 60 min/day of practicing physical activities for children was negatively associated with overweight and obesity.TV as a media has a disturbing potential to negatively affect many aspects of children's healthy development, including weight status. In this regard, the present study found a significant correlation between duration of T.V watching & computer use and overweight or obesity in children. Short duration (less than 1 hour) of daily use of T.V was protective factor for overweight or obesity, while longer duration of daily use of computer (3- 4 hours) was a risk factor for overweight and obesity. This could be explained by the fact that frequent TV watching may lead to increased energy intake as food advertising intentionally targets young children and encourages them to consume high calorie, junk foods on a regular

basis. Also, frequent TV viewing may lead to decreased energy expenditure as it increases time spent sitting and could also displace exercise because of the lack of time. Furthermore, there were many studies confirmed the relationship between screen time and overweight & obesity among young children that found in the current study as Zhang et al (2017) who indicated a positive association of TV watching time with the risk of obesity and central obesity. Similarly, results from Tester et al (2018) revealed that children who watching more than two hours per day of television were 1.4 time more likely to be obese than their peers who were watching less or equal two hours. Also, the odds of obesity were higher for children who watching television more than three hours per day.

The findings of the present study also supported by Hong et al (2016) said that the number of hours spent in watching TV or videos were positively associated with overweight and obesity. Furthermore, Sorrie et al 2017 found that children who spent more than 2 hour a day by watching television or playing games had 4.01 times more likely chance of being overweight/ obese as compared to those who spent less than 2 hours. On the contrary to the present study, some studies mentioned that there was no association between screen time and overweight or obesity among children as Mezie-Okoye & Alex-Hart (2015). The current results illustrated that there is a significant relation between night sleep hours and children's weight as overweight and obesity were more prevalent among those sleeping for shorter duration at night (less than 8 hours). An explanation for these results may be due to the fact that sleep deprivation may have neuro-hormonal effects that increases caloric intake as it reduces leptin that suppresses appetite and encourages the body to expend energy and it increases the ghrelin hormone that triggers feeling of hunger. Also, chronic partial sleep deprivation causes feelings of fatigue which may lead to reduced physical activity. The present study corresponding to Dev et al (2013) who cited that development of overweight/ obesity in children who slept for 8 hours and less per night was approximately 2.2 times of that preschool-aged children who slept for 9 and more hours . Moreover, Fisher et al. (2014) reported that shorter nighttime sleep was associated with higher total energy intake. Children sleeping less than 10 h consumed around 50 kcal per day more than those sleeping 11–12 h at night. In contrast, Nielsen et al (2010) found a positive association between nighttime sleep duration and overweight/obesity risk in preschool children. Fast food has become a prominent feature of the diet of children worldwide which can lead to early development of obesity and cardiovascular diseases. The present study portrayed that overweight and obesity were more evident among children who were eating fast food especially with frequent consumption. This could be explained by the fact that fast food which is rich with saturated fats, sugar and salts increase caloric intake and lead to obesity in children. With regard the frequency of fast food consumption, the results of the current study were consistent with a study of Braithwaite et al (2014) who declared that there was a statistically significant association between frequent and very frequent fast-food consumption and increased BMI.

It was apparent from the present study that children who were not eating during watching television were less likely to be overweight or obese than their counterparts. This may be attributed to the fact that watching TV make children eating with mindless that often results in the consumption of larger food portions as children who are given the opportunity to eat while watching TV may become less sensitive to internal cues of satiety. Also, exposure to food advertising provided by media, especially commercials for fast foods, soft drinks, sweets, and chocolates, may influence the children's food choices towards these foods that may increase weight. The results of the current study were consistent with a study done by Nasreddine et al (2017) as they found eating in front of the TV was associated with an 8% increase in the probability of overweight/obesity. The same was mentioned by Vik et al (2013) .The association between sugar-sweetened beverages, especially soda consumption and children's weight is observed in the current study where overweight and obesity were more prevalent among children who were drinking soda daily (82.4%) with significant correlation between drinking soda and children's weight. This may be due to excessive consumption of soft drinks and industrialized juices, with low levels of vitamins and minerals and high levels of additives and sugars lead to increasing the energy content of the diet and encouraging the occurrence of obesity .The findings of the present study were in agreement with several studies as a study by Millar et al (2014) who found that higher BMI z-scores were strongly associated with the consumption of sugar sweetened beverages and high fat foods. Similarly, to the present study, study done by Charvet & Huffman (2019) indicated that the intake of sugar-sweetened beverages, particularly fruit drinks, was significantly higher in overweight/obese children when compared with their under/ normal weight counterparts. The results of the present study were incongruent with a review concluded that there was no association between soda drinking and children's weight (Gibson, 2008).

The present study also found a statistically significant positive relationship between total energy intake and overweight or obesity as the mean of total energy intake among overweight & obese children were higher than normal counterparts (1912.98±561.61, 1223.87±413.01 respectively). These results were in harmony with other studies such as Vernarelli, Mitchell, Hartman & Rolls (2011) revealed that density of energy intake was associated with an increased intake of sugar or fat and lower intake of vegetables and fruit and increased BMI The same results of the present study's findings were observed in a study conducted in the United Arab Emirates (UAE). The findings indicated that approximately 25% of males and 41% of females were overweight or obese. Those children consumed more than the recommended energy intake (Ng et al., 2011). Similarly, Tester et al (2018) found that mean energy intake in daily kilocalories was 1575 kcal/day for the entire sample, with respective means by category as follows: normal weight: 1558 kcal/day, overweight: 1619 kcal/day , obesity: 1644 kcal/day and severe obesity: 1644 kcal/day. On the contrary to the present study, Skinner et al (2014) found that there was not statistically significant relation between energy intake and weight status in children.

Macronutrients were mainly considered as sources of energy. As observed in the present study, statistically significant relation existed between fat intakes, fat density and children's weight as the mean of fat intake for overweight and obese children (88.32±41.31) was nearly twofold the mean of fat intake for normal ones (45.60±25.93). Additionally, overweight and obesity were highest among children who consuming fat above the acceptable range with significant correlation between fat density and children's weight. This may be attributed to the fact that fat is tastier and energy dense compared to protein and carbohydrate, and it has less ability to regulate hunger and satiety and, hence, is more likely to lead to over-consumption that may lead to weight gain. The results of the current study were consistent with a study by Salama &Tayel (2018) who found that fat intake among preschoolers was 40.7±0.93 gram in the normal weight category; 43.9±2.19 gram in those who were overweight and 45.9±2.04 gram in those who were obese, with a significant difference between categories. However, carbohydrates have been linked to disease for many decades and more recently with an epidemic of type 2 diabetes . It was noticed from the results of the present study that the mean of CHO intake for overweight & obese was more than normal counterparts (254.16±85.26 and 180.08±68.24 respectively). Moreover, carbohydrate (percent of energy) intake was negatively correlated with overweight and obesity and this was not surprising, as the consumption of fat has increased, the relative contribution of carbohydrates to total energy intake has decreased, although intake remains above recommendations. It is worth noting that the correlation between carbohydrate density and body weight was not maintained .In accordance to the results of the current study, a study conducted in Kuwait indicated that almost half of the children participating in this study exceeded the average recommended intake of carbohydrates by 100% (Zaghloul et al., 2013). Concerning the current health problems of the children, the results of the present study showed a strong correlation between hypothyroidism and musculoskeletal problems and overweight or obesity. It was evident that all children who had hypothyroidism and more than three quarters of those who had musculoskeletal problems were overweight or obese.In congruent of these results, Ghergherehchi & Hazhir (2015) showed that subclinical hypothyroidism was seen in children with obesity (14.7%) compared with normal subjects (6.8%). One of the most important components of family context is the family history of overweight or obesity which considered an important predictor for overweight and obesity in the offspring. Moreover, obesogenic factors such as unhealthy eating and a sedentary lifestyle and behavioral traits can be easily passed down from parents to children through the family socialization process. (Shafaghi et al., 2014). This fact was reflected in the present study where more than two thirds of overweight and obese children had family history of overweight or obesity.

5. CONCLUSION

Based upon the findings of the current study it could be concluded that overweight and obesity is a prevalent problem among preschool children in the studied day care centers in Alexandria. Unhealthy lifestyle practices as eating fast food, increased fatty food intake and sedentary lifestyle, family history of obesity or thyroid problems and early feeding practices are the major risk factors for developing childhood overweight and obesity. It could be concluded that childhood overweight & obesity had positively affected by low educated fathers, non-working mothers, and low crowding index.

6. RECOMMENDATION

Based on the results of the present study, the following recommendations are suggested:

1. Enhance legislative and regulatory measures to promote nutrition through conducting national and international conferences, workshops and training courses.

2. Routine screening for overweight and obesity of the children in day care centers through periodic anthropometric measurements.
3. Effective nutritional counseling for children's care providers should be provided in the various primary health care settings.
4. Banning unhealthy food advertisements to help children improve their food choices.
5. Further research should be encouraged regarding Assess the effect of educational program on improving nutritional status and preventing childhood obesity

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