

## برنامج غذائي لتنمية وعي أمهات اطفال متلازمه داون و أثره على وزن الجسم

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### Introduction

Down syndrome (DS) is a chromosomal abnormality that is the most common hereditary intellectual disability in humans (WHO , 2017) . Also Down Syndrome is a genetic disorder resulting from a trisomy of chromosome 21 (whole or part), which occurs due to the failure of chromosome 21 to separate during gametogenesis, resulting in an extra chromosome in all body cells (Ghezzeo et al., 2014 and Aivazidis et al., 2017). Down syndrome is the single most common genetic cause of mental retardation. Governmental care of this Syndrome and other handicapping conditions has increased tremendously in the past few years to the extent that ( DS) prenatal screening is still inaccessible to most families and almost all cases of Down Syndrome are diagnosed postnatally (Ezzat and Solaf, 2018), There are three main cytogenetic forms of (DS): free trisomy 21, consisting of a supplementary chromosome 21, in all cells, mosaic trisomy 21 which has two cell lineages, one with the normal number of chromosomes and another one with an extra chromosome 21 with the mechanism of occurrence consisting of an error or misdivision following fertilization during cell division and robertsonian translocation trisomy 21 which occurs in only 2-4% of the cases , about 90% of free trisomy 21 is from a maternal meiotic error and only a small fraction from paternal errors (Plaiasu , 2017) . Children with Down syndrome have slanted eyes, thick lips, a large tongue, wide and small hands with short fingers, and a short and thick neck, Many

problems are linked to(DS), including metabolic disorders, tissue dimorphism, internal organ abnormalities, cerebral difficulties, and phenotypic characteristics. This phenomenon causes structural and functional central nervous system (CNS) disorders, cardiovascular defects, musculoskeletal system dysfunction , digestive system and metabolic disorders, nutritional deficiencies, abnormal immune function, and endocrine disruption and intellectual disabilities. Intellectual disability/mental retardation, early Alzheimer's disease start and the appearance of other phenotypic traits such as narrow slanted eyes, a flat nose, and short stature are all symptoms ,Thyroid problems, immunological disturbances, and growth abnormalities are some serious effects that may influence the health of people with Down syndrome. Patients with Down syndrome commonly present with characteristic facial features. Delayed development, and intellectual disability (**Ayat et al .,2021**). Children with Down syndrome suffer from overweight or obesity and the associated risks of diseases resulting from it. The growth of a child with Down syndrome differs from that of normal children, and even at puberty, the increase in growth is less than that of their peers. (**Peter et al., 2020**). The program consists of 4 sessions on nutrients such as (protein, carbohydrates and prevention food) their importance , sources, how to plan healthy meals and the impact of this on a child with Down syndrome .

The objective of this study was to determine the nutritional program to develop the awareness of mothers' children with Down syndrome and its Impact on the body weight .

## **Subjects and methods**

## **Subjects**

### **The research samples**

The study included 50 Egyptian mothers with children with (DS) (28 males and 22 females) they are, selected from Assiut city. The inclusion criteria were age between 6 and 11 years, males and females, being diagnosed with Down syndrome, and consenting to participate and signing a consent form (Parents or guardians).

## **Methods**

### **Data collection**

#### **Socioeconomic status**

Age, school grade, parent's education, parent's familial relationship, Parents relatives, family size and monthly income were all collected .

#### **Health status form.**

A questionnaire was administered by the researcher for obtaining information such as : practising exercise or not . Medical histories of diseases such as heart disease, thyroid problems, diabetes, and high blood pressure were collected .

### **The nutritional program design**

The program consisted of 4 sessions , distributed as follows: the first session about healthy and building foods , the second session about the energy , the third session about prevention foods, the fourth session about how to design balanced meals .

### **Anthropometric measurements**

Anthropometric measurements of body weight and height were measured and then compared with standard measures for Egyptian children aged 6 -11 years, according to (*El-Shafie et al., 2020*) .

### **Height**

Height was measured to the nearest 0.5 cm , where the subjects were advised to stand up straight with the head, their feet together, shoulder in the horizontal plane, and the backs resting on the wall ( *Sanchez et al ., 2018* ) .

### **Weight**

Weight was measured before and after the application of the diet using an electronic digital scale with a capacity of 200 kg and precision of 50g (Beurer Diagnostic Scale BF105 -Germany) (*Feliciano et al. , 2014*) .

Subjects wore light clothing and without no shoes prior to the measurements. Weight was assessed to the nearest 0.1kg (*Zhang et al ., 2016*) .

### **Body mass index (BMI)**

The BMI was calculated according to the following equation:

$$\text{BMI} = \frac{\text{weight (kg)}}{\text{height (m)}^2} . \quad (\text{Cicekli, 2019})$$

### **Ethics research**

All subjects included in this study provided written informed consent, and the protocol of this study was approved by the ethics committee of the Faculty of Medicine, Assiut University .

### **Data analysis**

Statistical analysis was carried out according to **Steel and Torrie(1960)**.

## Results and discussion

**Table 1 : Socioeconomic status**

Socioeconomic status		No	(%)	P. value
School grade of children	Illiterate	18	(36)	<b>**0.01</b>
	Primary	32	(64)	
	Total	50	(100)	
Mother's education	Illiterate	16	(32)	<b>**0.01</b>
	Primary	12	(24)	
	Preparatory	5	(10)	
	Secondary	7	(15)	
	University	10	(20)	
Father's education	Illiterate	12	(24)	<b>**0.01</b>
	Primary	10	(20)	
	Preparatory	6	(12)	
	Secondary	4	(8)	
	University	50	(100)	
Mother's job	Work	14	(28)	<b>**0.01</b>
	Don't work	36	(72)	
Father's job	Work	36	(72)	<b>**0.01</b>
	Don't work	14	(28)	
Family size	<5	10	(20)	<b>*0.03</b>
	5 – 7	30	(60)	
	>8	10	(20)	
Parents relatives	Yes	19	(38)	<b>**0.01</b>
	No	31	(62)	
Income (EGP/month)	Enough	19	(38)	<b>**0.01</b>
	Not enough	31	(62)	

Chi-square  $P < 0.001$  \*\* &  $p < 0.05$  \* &  $p > 0.05$  N.S

The data in **Table 1** revealed that the majority of socioeconomic status of children with Down syndrome were in primary school, and with regard to the education of the father and mother, the majority of fathers had university degrees, while the mothers were mostly illiterate. For the job of mothers, it was 28% work, while the majority of fathers job were 72% work. In terms of average income, it was insufficient because most of the mothers are housewives, and the size of the family ranged from 5 to 7 members. These results agree with **Norizan and Shamsuddin**, (2010) and **Shereen et al.**, (2022) they reported that both groups attended elementary school. Regarding mother education, most mothers of the non-DS children earned university degrees. In contrast, most mothers in the (DS) group were illiterate, with a significant minority having preparatory certificates. The study revealed that DS children had Larger families than children without (DS).

### **Table 2: Health status of Down syndrome children**

Table 3- A: The nutritional program for mothers' children with Down syndrome

Questionnaire of Health status	Yes		No		P. value
	N.	%	N	%	
Does the child suffer from obesity?	32	64	18	36	0.01**
Does the child have heart problems?	2	4	48	96	0.001**
Does the child suffer from diabetes?	-	-	50	100	--
Is the child suffer from tooth decay problems?	31	62	19	38	0.01**
Does the child suffer from thyroid problems?	4	8	46	92	0.001**
Does the child suffer from anemia?	11	22	39	78	0.01**
Does the child suffer from an increased appetite ?	41	82	9	18	0.001**
Does the child suffer from food allergy?	6	12	44	88	0.001**
Does the child suffer from digestive problems?	15	30	35	70	0.01**

Chi-square  $P < 0.001$  \*\* &  $p < 0.05$  \* &  $p > 0.05$  N.S

The data in **Table 2** outlined that the health status of Down syndrome children was observed to be obesity with and averaged 64%, with regard to heart disease, the ratio was (4%) , but they did not have diabetes. while they had dental problems at a ratio of (62%) . Note that a small number of children with Down syndrome suffer from thyroid problems and food allergies were (8% - 12% respectively). While children suffer from anaemia at a ratio of 22%, the majority suffer from increased appetite at a ratio of 82% and, some children suffer from digestive problems with at a ratio of 15%. These results disagree with **Mehr et al., (2015)** and **Mittal et al.,(2020)**, how showed that the anaemia in children with Down syndrome was higher than in normal children, while **Bello et al., (2017)** stated that some children with cardiovascular disease and

celiac disease in their study had less. These results agree with **Ram and China, (2011)** who reported that gastrointestinal problems in people with DS may be due to metabolic or dietary variables, including

Evaluation methods	Pro.		Chi P.	
	Yes No. %	No No. %		
<b>First session: Healthy and building foods.</b>	1. Animal protein is not important in cell regeneration..	12 24	9 18	31.84 0.001**
	2. Proteins protect the body from diseases and infections.	11 22	13 26	21.45 0.001**
	3. Protein is an essential source of energy.	35 70	5 10	21.13 0.001**
	4. Rice is one of the high-value proteins.	17 34	12 24	12.41 0.001**
	5. Protein of low vital value cannot carry out the process of regeneration and repair of body tissues.	11 22	27 54	22.06 0.001**
	6. A gram of protein contains 4 calories.	15 30	8 16	16.07 0.001**
<b>Second session: Energy foods</b>	1. Carbohydrates are not considered a source of energy.	13 26	26 54	15.79 0.001**
	2. Eating fiber reduces the incidence of constipation.	17 34	8 16	6.877 0.03*
	3. An increase in protein leads to use carbohydrates as an energy source.	6 12	42 84	18.1 0.001**
	4. potatoes and rice are poor sources of starches.	11 22	17 34	10.26 0.001**
	5. Fat is a source of energy.	13 26	19 38	14.93 0.001**
	6. Eating fats leads to feelings of hunger and insatiability.	9 18	19 38	17.04 0.001**
	7. Fish is a source of Omega 3 fatty acids.	15 30	12 24	16.57 0.001**
Chi-square P< 0.001 ** & p<0.05 * & p>0.05 N.S				
	No No. %	Sometimes No. %	Chi P.	
	37 74	8 16	31.84 0.001**	
	6 12	10 20	21.45 0.001**	
	29 58	12 24	21.13 0.001**	
	27 54	27 54	12.41 0.001**	
	7 14	11 22	22.06 0.001**	
	4 8	11 22	16.07 0.001**	
	8 16	13 26	15.79 0.001**	
	16 32	13 26	6.877 0.03*	
	22 44	3 6	18.1 0.001**	
	33 66	11 22	10.26 0.001**	
	6 12	13 26	14.93 0.001**	
	9 18	12 24	17.04 0.001**	
	7 14	8 16	16.57 0.001**	

Table 3- B : The nutritional program for mothers' children with Down syndrome

<b>third session:</b> Prevention foods	1. Increased vitamin A helps in the growth of bones and teeth.	8	16	7	14	35	70	25	50	5	10	20	40	13.18	0.001**
	2. Vitamin D deficiency leads to rickets.	10	20	11	22	29	58	27	54	8	16	15	30	12.74	0.001**
	3. Citrus fruits are a poor source of vitamin C.	15	30	8	16	27	54	9	18	27	54	14	28	15.94	0.001**
	4. Whole grains are a source of vitamin B.	7	14	13	26	30	60	26	52	6	12	18	36	16.52	0.001**
	5. Excess zinc leads to poor learning ability.	5	10	36	72	9	18	24	48	8	16	18	36	33.27	0.001**
	6. Milk is not a source of calcium.	15	30	11	22	24	48	7	14	24	48	19	38	8.32	0.03*
	7. Folic acids has an impotent function in building brain cells.	3	6	42	84	5	10	29	58	3	6	18	36	62.27	0.001**
<b>Fourth session.</b> How to design balance meals	1-15 Variety of food must be served at one meal.	24	48	13	26	13	26	35	70	6	12	9	18	5.36	0.08 N.S
	2-Variety of food offered from day to day.	31	62	9	18	10	20	42	84	2	4	6	12	7.11	0.03*
	3-Take into account the health status of your child when planning the meal.	26	54	10	20	14	28	39	78	2	4	9	18	9.02	0.001**
	4-The economic situation is taken into account when planning the meal.	32	64	3	6	15	30	40	80	1	2	9	18	3.39	0.09 N.S
	5-Take into account the number of family members when planning the meal.	21	42	9	18	20	40	29	58	6	12	15	30	2.59	0.11 N.S
	6-Food availability in markets is taken into account when planning a meal.	30	60	7	14	13	26	37	74	5	10	8	16	2.26	0.13 N.S
	7-Make sure that the meal contains all the nutrients.	10	20	21	42	19	38	33	66	10	20	7	14	21.74	0.001**

According to the data in **Table 3(A&B )** about the nutritional program for mothers' children with Down syndrome, the answer's mothers' the childrens' health improved at the end of the program when compared with the childrens' health at the beginning. In the first session highest value was recorded in question 1. Regarding the second session the highest value was recorded for questions (3) and (5), while in the third session and forth sessions, the highest value was recorded for question (7). These study agree with **Barnoy et al., (2017)** **Kalyoncu and Giray , (2018)** , **Alhaddad et al ., (2018)** and **El-Shazali et al., (2018)**, mothers have low level of knowledge about DS; on the other hand, high-level information and guidance must be provided to parents so that they properly look after DS; patients. deficits in the general knowledge about DS leading to unfavorable attitudes towards children with DS ,counselling and information should be given to parents of children with DS to promote effective management, increase family adaptation and decrease the level of discomfort. These study was disagree with **Alosaimi et al., (2020)** who found that, mothers of DS children had good general knowledge about DS in special Care centers It was observed that more than half of mothers had a moderate level and less than half of them had a high level of knowledge immediately after the implementation of an educational program. This could be attributed to the fact that the content of program was developed based on mothers and children needs.

Table 4-A : Mean measurements indices of children with Down syndrome (for girls)

Ages	Height (H)		T	P	Weight (W)			F	p	Body Mass Index (BMI)			F	P
	sample	** Ideal measurements			Pre.	** Ideal measurements	Post.			Pre.	** Ideal measurements	Post.		
6	89.5	115	11.5	0.01**	15.05	20a	14b	7.1	0.02*	18.79a	15.12b	17.48a	7.1	0.03*
7	105.3	121	9.5	0.01**	22.5a	23a	19.56b	6.5	0.04*	20.29a	15.71c	17.64b	9.2	0.01**
8	113.5	126	9.1	0.02*	24.25	25a	22.8b	6.1	0.04*	18.85a	15.75b	17.69a	6.2	0.04*
9	119.2	133	8.5	0.02*	29.8a	28a	28.20a	2.1	0.07	20.97a	15.83b	19.85a	5.9	0.04*
10	125.16	139	8.3	0.03*	33.21	32a	30.50b	5.5	0.04*	21.20a	16.56b	19.47a	5.3	0.04*
11	130.25	145	9.0	0.02*	46.5a	36b	45.15a	6.3	0.03*	26.82a	17.12b	26.61a	4.9	0.04*

Chi-square P<0.001 \*\*& p<0.05 \* & p>0.05 N.S \*BMI =  $\frac{Weight (Kg)}{Height (m^2)}$  \*\*WHO(2007)

Table 4-B : Mean measurements indices of children with Down syndrome (for boys)

Ages	Height (H)		T	P	Weight (W)			F	p	Body Mass Index (BMI)			F	P
	Sample	** Ideal measurements			Pre.	** Ideal measurements	Post.			Pre.	** Ideal measurements	Post.		
6 *	91	116	11.2	0.01**	15.8a	21b	14.96a	5.2	0.03*	19.07a	15.60c	18.06b	8.6	0.01**
7	110.6	122	9.5	0.02*	21.06b	23a	19.44b	5.4	0.03*	17.22a	15.45b	15.90b	7.1	0.02*
8	112	127	8.6	0.03*	22.4b	25a	22.01b	5.3	0.03*	17.86a	15.5b	17.55a	6.9	0.02*
9	122	133	7.5	0.04*	31.38a	28b	28.58b	5.6	0.03*	21.08a	15.8c	19.20b	9.1	0.01**
10	119.6	138	8.1	0.03*	30.86a	31a	30.16a	2.1	0.08	21.57a	16.27b	21.08a	6.6	0.02*
11	124.2	143	9.4	0.02*	37.15a	35a	35.75a	1.9	0.1	24.08a	17.11b	23.17a	6.7	0.02*

The data in **Table 4 (A&B)** reported that the difference in the mean of body mass index (BMI) between the age groups in girls at the age of 11 years was (26.82) before and after the program it became (26.61) compared to boys at their age, it was (24.08) before the program and after the program it became (23.17). The BMI of boys was higher at 6 and 9 years of age compared to girls of the same age, in the anthropometric measures of boys from the normal range, as there is a decrease in the average height (H) in all different age groups from the normal range of , and we notice a rise in the body mass index. Also, body mass index (BMI) was higher in all groups as compared with the World Health Organization (WHO,2007). This results disagree with (**Selvi et al .,2017**) In the present study, the females with down syndrome had a mean BMI the showing lesser BMI (25.11) than males (27.3).

**Chaudhary,(2019) and Doğan et al., (2020)** found that obesity was prevalent among 51% of children with DS; moreover, one study found that overweight and obesity were prevalent among 80% of DS subjects in their study. This results agree with **Samya and Nagwa , (2021)** , the current study showed that, most of children had obesity and overweight due to disabilities that make children sedentary and experience more barriers to physical activity participation because of physical, sensory and cognitive impairments. Other factors associated with obesity include the higher rate of poverty reported among caregivers of children with DS that make it difficult to purchase

This results agree .healthier food items such as fruits and vegetables with **Chaudhary, (2019)** who found that other families constantly offer food that is high in calories, as reinforcers for good behaviors, or the fear of appearing not to be a caring parent and a lack of knowledge

These about lifestyle behaviors may predispose to weight gain. results agree with **Bertapli *et al.*, (2016)** they reported significantly shorter stature and greater BMI in DS adolescents as compared to corresponding siblings . These results agree with **Bertapelli *et al.*, (2016 ) and Nordstrom *et al.*, 2020 )** they found that the first consideration relies on an outcome of eating habits anthropometric measurements. **Ando *et al.* , (2018)** reported that the DS children are predisposed to obesity. The DS prevalence of overweight and obesity has been reported to range between 20 and 23 in both females and males also stem from altered dietary intakes, reduced physical activity, and a basal inetabolic rate below that of the general pediatric population. **Cowley *et al.*, (2010 )** outlined that the physical activity does not only produce caloric burst, it also seems to positively impact the ability to perform daily tasks and thus improve independence in DS adults.

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## **Nutritional Program to Develop the Awareness of Mother's Children with Down Syndrome and it's Impact on Body Weight**

### **Abstract**

Down Syndrome (DS) is the most common genetic cause of intellectual disability. This study aims to raise the level of nutritional awareness among mother's children with Down Syndrome. The research sample included 50 children with Down Syndrome (28 males and 22 females) between the ages of 6–11 years from Assiut city. Data about socioeconomic status and health status questionnaire were collected, The program conducted to improve the knowledge of mother's children with Down Syndrome and the program consisted of 4 sessions, Body mass index (BMI) was calculated using the measure of body weight and height. The results showed that most of the mother's children were illiterate and housewives, and their awareness of healthy food was low and the most of children suffer from obesity with ratio (64%) and some of them suffer from dental and digestive problems. The children with Down Syndrome are shorter than the ideal measurements when compared with children in the same age and have a body mass index more than normal. So, this study recommended to make nutritional initiatives and campaigns to reduce the risk of obesity in children with Down Syndrome through balanced diets to avoid obesity.

**Key words :**Down Syndrome, Nutritional Awareness, Healthy Food , Body Mass Index

## برنامج غذائي لتنمية وعي أمهات اطفال متلازمه داون و أثره على وزن الجسم

### المستخلص

تهدف هذه الدراسة إلى زيادة الوعي الغذائي لدى أمهات الأطفال ذوي متلازمة داون من خلال تطبيق برنامج الإرشاد الغذائي. تضمنت عينة البحث ٥٠ طفلاً من ذوي متلازمة داون (٢٨ ذكور - ٢٢ إناث) تتراوح أعمارهم بين ٦-١١ سنة من مدينة أسيوط ، تم جمع بيانات عن الحالة الاجتماعية والتاريخ الصحي. تم حساب مؤشر كتلة الجسم باستخدام قياسات وزن الجسم والطول. وكشفت النتائج أن معظم الأمهات أميات و ربات منزل ، و أن معظم الأطفال يعانون من السمنة بنسبة ٦٤% و بعضهم يعانون من مشاكل في الأسنان و الجهاز الهضمي ، و أن أطفال متلازمة داون أقصر في الطول بالمقارنة بالأطفال من نفس العمر و مؤشر كتلة جسمهم أعلى من الطبيعي ، لذلك أوصت هذه الدراسة باتخاذ مبادرات وحملات غذائية للحد من مخاطر السمنة لدى الأطفال ذوي متلازمة داون من خلال نظام غذائي متوازن لتجنب السمنة.

### الكلمات المفتاحية

داون سيندروم (متلازمة داون)، مؤشر كتله الجسم ، الوعي الغذائي ، الغذاء صحي

weighting induced by Bleomycin in adult male Wistar albino rats (180±10g) were randomly divided into four groups (10 rats each) as follows: group (1) normal healthy rats as control groups, group (2) rats those were subjected to oral administration of MEE at a dose (450 mg/kg/day) for six weeks, group (3) rats those were subjected to IP injection at a dose (15 mg/kg twice weekly) of Bleomycin-induced pulmonary fibrosis for 4 weeks, and group (4) Bleomycin-induced pulmonary fibrosis rats those were treated with oral of (450

mg/kg/day) MEE for six weeks. The results revealed that MEE succeeded to decline the lung fibrosis-induced by Bleomycin; this was evidenced by the significant reduction of liver and kidney function, total cholesterol, triglycerides, LDL, and glucose coupled with marked improvement in HDL. So this study recommended to use melissa in diets for its many benefits.

**Keywords:** *Melissa officinalis*, Bleomycin, Liver and kidney functions, lung fibrosis, Lipids profile, Rats.