*Journal of Food and Nutrition Research, 2023, Vol. 11, No. 1, 102-108*
Available online at http://pubs.sciepub.com/jfnr/11/1/10
Published by Science and Education Publishing
DOI:10.12691/jfnr-11-1-10

# Dietary Supplement Use among Children Whose Parents Work at National Research Centre: A Pilot Study

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*Received December 14, 2022; Revised January 22, 2023; Accepted January 30, 2023*

**Abstract** Background: Dietary supplements use is increasing globally especially during confinement, with particular reference to vitamin C, vitamin D and zinc. Aim: To assess dietary supplements use and its association with sociodemographic factors among children whose parents work at National Research Centre Cairo, Egypt. Method: An online cross-sectional study was carried out among 200 children < 19 years old whose parents are working at NRC (87 mother and 19 father). An online questionnaire was prepared to elucidate dietary supplements use during COVID-19 pandemic lockdown, from December 2020 to March 2021. Results: Overall prevalence of Dietary supplements consumption was (99\200 =49.5%) with no sex difference.DS were used significantly more often by children whose parents are highly educated or related to those working in the scientific sector. The most frequently used supplements as reported by parents were vitamin C (81.5%), zinc (53.8%) and vitamin D (46.9%). More than one third of children had iron and calcium supplement (36.9% and 35.4% respectively). No significant difference was found between supplementation and body mass index.DS were used to improve health (58.5%) and improve immunity (40.6%) with either physician or pharmacist advice. DS was taken with and without medical prescription. more than 20% of respondents are not aware that DS have side effects. Conclusion: Parental education is essential as regards to Dietary supplements use either for their children or for themselves.

***Keywords:*** *dietary supplements, COVID-19, children, consumption, awareness, respondent*

**Cite This Article:** Sara F Sallam, Amal Hassanien, Hala H El Ashry, Amina H. Awad, Iman H Kamel, Nihad H Ahmed, Alshaimaa F.Kamal, and Saneya A. Wahba, "Dietary Supplement Use among Children Whose Parents Work at National Research Centre: A Pilot Study." *Journal of Food and Nutrition Research*, vol. 11, no. 1 (2023): 102-108. doi: 10.12691/jfnr-11-1-10.

## 1. Introduction

At the end of 2019, a novel coronavirus was identified as the cause of a cluster of pneumonia cases in Wuhan, a city in the Hubei province of China. It has rapidly spread, resulting in an epidemic throughout China, followed by an increasing number of cases in other countries throughout the world. In February 2020, the World Health Organization (WHO) designated the disease COVID-19, which stands for coronavirus disease 2019 [1]. The virus that causes COVID-19 is designated severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2); previously, it was referred to as 2019-nCoV. The WHO declared COVID-19 a pandemic on March 11, 2020 [2]. Although SARS-CoV-2(COVID-19) is the seventh known human coronavirus [3], yet it is new to the human immune system and so there was no underlying existing immunity against it, this is why COVID-19 spreads so rapidly and has caused such severe illness.

The immune system defends the body against pathogens with innate and\or adaptive immunity. The first line of defense is the innate immune system that includes physical barriers (skin and gut epithelium) that prevent pathogen entry. Besides the white blood cells (neutrophils, macrophages, natural killer) that identify and eliminate pathogens. Adaptive immune system comes next with B and T lymphocytes which are responsible for humoral immunity and cell-mediated immunity respectively. Generally, children have more active innate immunity than adults. [4]

Human body requires several vitamins and minerals for proper immune function, and clinical deficiencies of these nutrients can increase susceptibility to infections. [5] Deficiencies of certain micronutrients, such as vitamin D, zinc, and selenium have been associated with more severe diseases in observational studies [6,7] Accordingly Dietary supplements (DS)have been defined as substances taken by individuals to supplement the diet by increasing the total dietary consumption, concentration, metabolite constituent and extractor combination of the preceding substances. The DS include vitamins, minerals, herbs, amino acids and enzymes. They can be found in multiple forms such as capsules, tablets, powder or liquid [8].

Vitamin D has many immunoregulatory pathways through which vit D plays a significant role in viral infections prevention [9] vit D is often lower in elder children as they are not adequately supplemented with. No clear evidence was found about vitamin D supplementation effect on COVID-19 infection risk or severity. [10]

Zinc as a signaling molecule plays a role in immune function by increasing natural killer cells numbers which are important as host defense mechanism facing viruses. Adequate zinc levels have been associated with decrease infection incidence. Thus, zinc was considered to have benefits against COVID-19 [11,12].

Vitamin C has been proposed against COVID-19 due to its previous use against respiratory diseases, common cold and flu. Vit C promotes immunity by acting on many cells [13,14].

Knowing the importance of both inflammatory and immune responses to control COVID-19 infection, different Dietary supplements (DS) have been proposed with other medicines, as treatment and alone as immune support [15]. Giving DS among Children and adolescence is usually the parents' choice. [16] Few studies had discussed such issue. Accordingly, the aim of this work is to assess dietary supplements use and their association with sociodemographic factors among children whose parents work at National Research Centre, Cairo, Egypt. In addition to investigating different motivation for the use of these DS.

## 2. Subject and Method

A cross sectional study using an on-line survey was conducted at National Research Centre (NRC) between December 2020 to March 2021. Ethical approval was taken from NRC before the start of the study.

Data was collected using a specific questionnaire that was developed using Google forms by one of the team members.

Pilot-testing of the questionnaire was conducted on a convenient sample of 15 adults in order to check for the clarity, simplicity, and logical flow of the questions

The questionnaire included three different sections:

First section: Sociodemographic characteristics of the participants section which include their age, sex, marital status, educational level, and employment status.

Second section: Participants were asked about the dietary supplements that are used among their children living in the same household. A list of choices for each of supplements was given to participants to check one or more of these choices they have used.

Third section: Participants were asked to identify the reasons behind taking these supplements, as well source of information and who are the ones who advised them to use dietary supplements.to this list of items for each type of dietary supplement, participants were also given the option to specify any other items. Participants were also asked to submit their children's weights in kg. and heights in cm.

Sampling: Eligible participants were invited to participate in survey through telephone call first, explaining the aim and objectives of the study. Then the online questionnaire was sent to those who agreed to participate. More than 180 persons were invited to answer the questionnaire, 22 refused to join the study, 38were excluded due incomplete forms or repeated copies while others (14 participants) were excluded due to the missing of core answers of the proposed questionnaire. Only 106 respondents completed the form and accepted to join this pilot study.

Inclusion criteria: Employees working at National Research Center. Awareness of the person of their body weight and length and of their families' body weights or lengths. Exclusion criteria: Refusal of participation, Repeated responses, absences of offspring's, failure to submit the weight and height of their offspring's.

**Statistical analysis**: Data analysis was conducted using Statistical Package for Social Science (SPSS) statistics software version 25.0. Descriptive characteristics were presented as frequency and percentage. Continuous variables were expressed as range, mean ± standard deviation. while categorical variables were reported as frequencies and percentages, the chi square test was used to determine the association between categorical variables and dietary supplement use.

BMI calculation: As we mentioned before, participants were asked to submit their children weight and height during data collection (since we were in lockdown period). During data processing nutritional status of the children <5 was calculated using the WHO,2006 growth reference standards (WHO. 2006) [17].

Nutritional status was defined as underweight if WAZ < - 2 standard deviation (SD), stunting if HAZ < -2SD, wasting if WHZ < -2SD thin if BAZ < -2SD and obese if BAZ >2SD. A child was considered undernourished if he was either stunted, wasted or underweight.

Body mass index (BMI): BMI referred to the relationship between current weight and current height (BMI = weight (kg)/Height ($m^2$). The BMI was classified according to the WHO international classification of BMI (Underweight BMI < 18.5, Ideal: 18.5 < BMI < 25.0, Overweight: 25.0 < BMI < 30.0, Obese: BMI > 30) [18].

## 3. Results

This is a cross sectional study done during the lockdown period for COVID-19 using an online survey sent to National Research Centre staff (both scientific and non-scientific employees). The study ended up to 106 respondents 87(82%) mothers and 19(17.9%) fathers. More than 80% were married, 9.4% widows and 8.5% were divorced but all of them had children living with them in the same house. Total children count was 269 sons (43.5%) and daughters (56.5%). Children were grouped according to their age group 11.2% were below 5 years old, 23.8% were between 5-10 years old and 39.4% were between 11-19 years old and all age groups were living with their parents in the same house. Regarding the educational level of the participants 49% were post university degree holder, more than quarter (26.4%) were graduated from university while 2.8% were illiterate. The educational level was reflected on the participant occupation as 50%of them were from the scientific sector, 30% were administrators, 10.4% were technicians of NRC laboratories while 9.4%were workers (Table 1a & Table 1b).

**Table 1a. Sociodemographic characteristics of the studied respondents (n=106)**

| | Number | Percent |
|---|---|---|
| **Responders** | | |
| Mother | 87 | 82 |
| Father | 19 | 17.9 |
| **Marital status** | | |
| Married | 87 | 82.1 |
| Widow | 10 | 9.4 |
| Divorced | 9 | 8.5 |
| **Educational level** | | |
| Post university studies | 52 | 49 |
| University | 28 | 26.4 |
| High school | 17 | 16.6 |
| Primary school | 6 | 5.7 |
| Illiterate | 3 | 2.8 |
| **Occupational sector** | | |
| Scientific | 53 | 50 |
| Administrator | 32 | 30.2 |
| Technician | 11 | 10.4 |
| Worker | 10 | 9.4 |

**Table 1b. Characteristics of respondents 'children living in the same household (n=269)**

| | Number | Percent |
|---|---|---|
| Sex | | |
| Male | 117 | 43.5 |
| Female | 152 | 56.5 |
| Age | | |
| Mean ± SD | 14.1±7.77 | |
| Range (years) | 1-37 | |
| Age group | | |
| <5years | 30 | 11.2 |
| 5-10 years | 64 | 23.8 |
| 11-19 years | 106 | 39.4 |
| 20-25 years | 45 | 16.7 |
| >25 years | 24 | 8.9 |
| BMI | | |
| Underweight | 51 | 19 |
| Normal | 136 | 50.6 |
| Overweight | 51 | 19 |
| Obese | 31 | 11.5 |

High education levels of participant parents and hence their working jobs (scientific sectors) are the most determinants of dietary supplements use of their children. Age group 5-10 years had higher percentage of dietary supplement use (57.5%) with no significant difference. No significant differences were found as regards to dietary supplements intake and children sex, BMI (Table 2).

**Table 2. Prevalence of dietary supplements use among children < 19 years old of the studied subjects (n=200)**

| | User Number (%) | Non user Number (%) | p-value |
|---|---|---|---|
| Sex | | | |
| Male | 56(50) | 56(50) | |
| Female | 43(48.9) | 45(51.1) | 0.493 |
| Age group | | | |
| <5 years | 14(46.7) | 16(53.3) | |
| 5-10 years | 37(57.5) | 27(42.2) | 0.27 |
| 11-19 years | 48(45.3) | 58(54.7) | |
| BMI | | | |
| Underweight | 28(54.9) | 23(45.1) | |
| Normal | 48(50) | 48(50) | 0.7 |
| Overweight | 14(43.8) | 18(56.3) | |
| Obese | 9(42.9) | 12(57.1) | |
| Occupational Sector | | | |
| Scientific | 70(76.9) | 21(23.1) | |
| Administrator | 22(36.1) | 39(63.9) | 0.00 |
| Technician | 3(11.5) | 23(88.5) | |
| Helpers | 4(16.2) | 18(81.8) | |
| Educational level | | | |
| Post university studies | 68(79.1) | 18(20.9) | |
| University | 20(35.1) | 37(64.2) | |
| High school | 9(23.1) | 30(76.9) | 0.00 |
| Primary school | 0(0) | 11(100) | |
| Illiterate | 2(28.6) | 5(71.4) | |

Different types of dietary supplements were given by parents to their children during the lockdown period as demonstrated by Figure 1. The most frequently used supplement was vitamin C (81.5%) followed by zinc (53.8%). Third comes vitamin D (46.9%). However, one third of children took iron supplement (36.9%) while 35.4% took calcium.

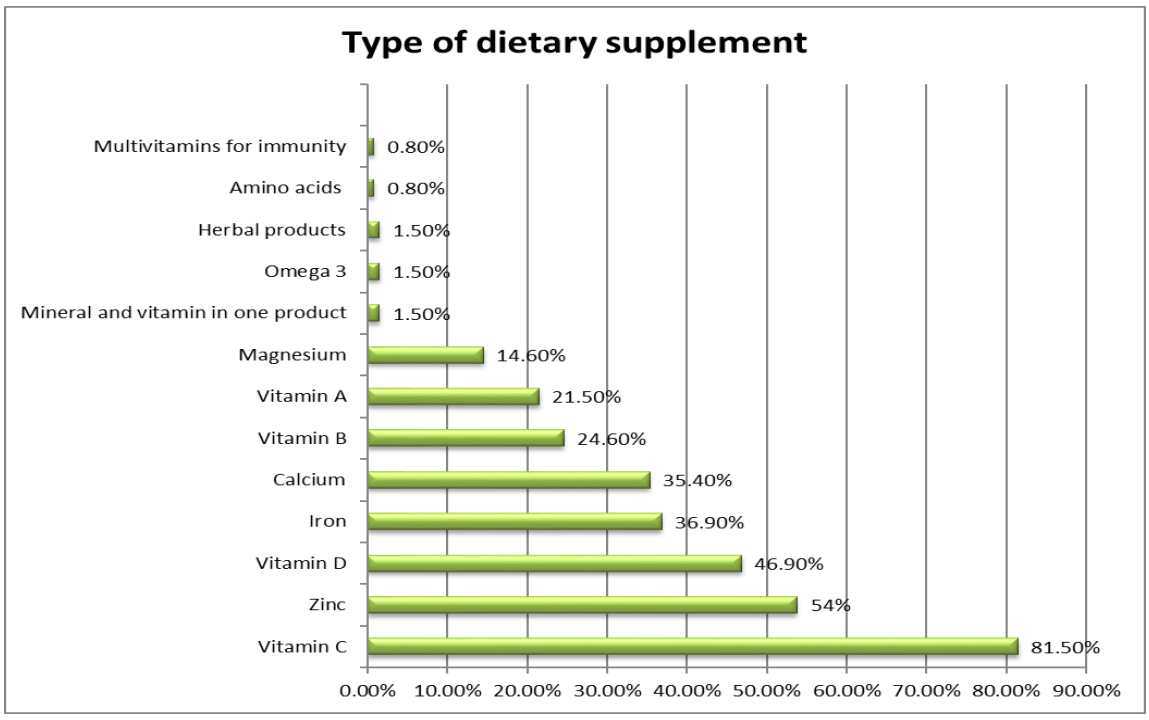


**Figure 1.** Dietary supplement use during COVID -19 pandemic (n=130) 9Responder can choose more than one choice for the same child)

**Table 3. Main reason for using the dietary supplement for children and adolescents**

| Reasons for using dietary supplements | Number | Percentage |
|---|---|---|
| Improve overall health | 62 | 58.5 |
| Maintenance of health | 15 | 14.2 |
| Supplement the diet | 15 | 14.2 |
| Prevention of disease | 14 | 13.2 |
| Improve the immunity | 43 | 40.6 |
| Skin health | 6 | 5.7 |
| To treat anemia | 18 | 17 |
| To increase weight | 3 | 2.8 |
| To decease weight | 4 | 3.8 |
| For bone health | 26 | 24.5 |
| Others | 7 | 6.6 |
| Recommended by doctor prescription | 12 | 11.3 |

Parents Motivation and\or reasons behind giving dietary supplements to their children were improving the overall health of their children (58.5%), improving their children immunity (40.6%), while preserving their children bone health (24.5%) (Table 3). This motivation was influenced by the source of information of the effect of these supplements. In this study the most popular way was the physician 70.8% followed by the pharmacist whether with or without the physician prescription (49.1%, 50% respectively). On the other hand, social media, relatives and online shopping have played a role on marketing of dietary supplement by 9.4%,9.4%,5.7% respectively (Figure 2).

Parents awareness about benefits and harms of dietary supplements use where shown in Table 4, where more than 80% of respondents have agreed that the intake of dietary supplement is important for health taking in consideration the indication, dose and duration of this supplement. But more than 50% of respondents were not sure or didn't know that blood analysis is needed before taking any dietary supplement.

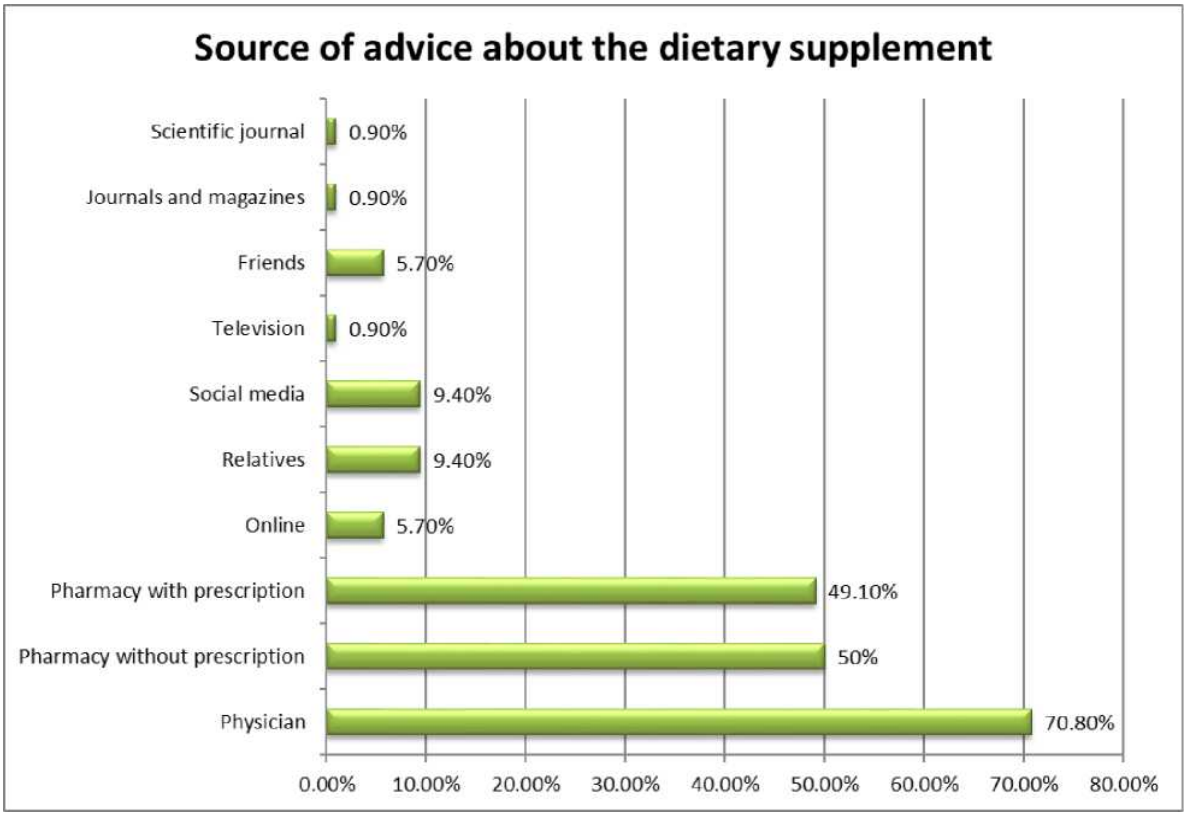


**Figure 2.** Sources of information about dietary supplements use during the pandemic (Responder can choose more than one choice for the same child)

**Table 4. Awareness of the respondents about the benefits and harms of the dietary intake**

| Question | Yes Number (%) | No Number (%) | Not sure (don't know) |
|---|---|---|---|
| The dietary supplement intake is important for health | 94(88.7) | 7(6.6) | 4(3.8) |
| Reading the indication of the dietary supplement is important | 95(89.6) | 8(7.5) | 2(1.9) |
| Increase frequency of dietary supplements is dangerous | 86(81.1) | 2(1.9) | 17(16) |
| Increase dose of dietary supplements is dangerous | 83(78.3) | 9(8.5) | 13(12.3) |
| Increase duration of dietary supplements is dangerous | 83(78.3) | 7(6.6) | 15(14.2) |
| Dietary supplements have side effects | 76(71.7) | 5(4.7) | 24(22.6) |
| Before taking dietary supplements, blood test should be done | 49(46.2) | 31(29.2) | 25(23.6) |
| The dietary supplement intake is safe when prescribed by a physician | 99(93.4) | 1(0.9) | 5(4.7) |

## 4. Discussion

Worldwide interest in immune related nutrients, food and dietary supplements has increased. This interest was markedly observed during COVID-19 first wave and was related to the number of surrounding cases and number of deaths [19].

Despite the fact that men had been involved in taking care of children health as part of raising them still women dominate in the aspects related to health. This was well observed in the percentage of mothers (80%) that have participated in the current study versus fathers. Over all consumption of DS was 49.5% near to the percentages mentioned in previous studies irrespective to the pandemic [20,21,22].

Meanwhile another study has showed lower DS consumption 5- 26% among different societies [23] Previous study by Dwyer et al., 2007 reported higher prevalence of DS (37%) in USA. [15] on the other hand the present study has found higher DS consumption (57%) among 5-10years children than other age groups, this is in agreement with other studies done by Huybrechts et al., 2010 and linowska et al., 2012. [24,25] while higher rate up to 65.1% was reported by Piekara et al., 2020 [26], and this may be due to excess use of vitamin C.

In the present study BMI was not a determinate for dietary supplementation in all age groups, and this is in agreement with Piekara et al., 2020 results [26].

Meanwhile parental education and in turn occupation had significant effect on children dietary supplementation, highest DS was among parents working in scientific sector (post university studies). Same results were mentioned by Namazi et al., 2019 where users of DS were young females with better education with or without children. [23] No other study has related the educational level and DS to children, but on a statistically based survey conducted in August 2020 in USA it was found that 75% of DS users were among the adult college education persons [27]. Away from the pandemic an Iranian study found higher DS consumption among girls with high educated mother but not high educated father [23].

In the present study vitamin C was the most frequent used DS followed by zinc and vit D (81.5%, 53.8%, 46.9% respectively). In concomitant with previous studies vitamin C and vitamin D were the most popular nutrients taken as DS [21,22] whereas during the COVID-19 pandemic vit C was the most frequent used DS in a Saudi Arabian study, while an American study reported an increase in vitamin C and zinc since the peak of pandemic [28,29]. The anti-oxidant antiinflammatory and immune boosting effects of vitamins C, D and zinc was the cause for their use during the pandemic [30]. This study revealed high use of iron and calcium (36.9%, 35.4% respectively). As regards Iron supplement it should be mentioned that iron supplement had increased among school children after the national campaign for early detection of anemia and stunting among school children. Whereas the high Calcium supplement percentage is due to its routine prescription to children by health care givers.

Improvement of child health was the first reason mentioned by respondents (mothers\fathers) for DS, followed by immunity improvement. This comes in agreement with [31]Karbownik et al., 2020 that have noticed increased dietary supplement requisition for immune-boosting targets. Other causes as maintaining bone health, anemia treatment, disease prevention was also mentioned. Other causes mentioned also included filling a nutritional gap, taking care of hair skin and nails, seasonal supplement for vit D and oily fish [32].

In the present study pharmacists appear to have a great role as source for DS to children by parents' despite of the presence of medical prescription. Television, social media, online, friends' opinion played an important role in influencing DS (almost 25%) versus 12 % for physician advice this may highlight new influencers of people choices and decisions. While similar results were reported by Italian study where 6% of respondents have used internet advertisement, TV commercials, press releases as sources of information [33] keeping pharmacists as a primary source of supplements information.

Respondents were asked about their beliefs about the importance of giving their children DS during the pandemic, 88.7% confirmed its benefits while 71% believe that DS had side effects. Parents who give DSs to children agree that dietary supplements are safe, useful, and effective in immune boosting [34,35]. Seventy five percent of participants didn't read the information and instruction in the DS package exceeding what Piekara et al. have mentioned about reading the ingredient of DS prescribed by the doctor, they also mentioned that almost all their respondents have followed the manufacturer instruction as regards dosage and duration [26]. In the same aspect 80% of the present study respondents are aware about the dangerous of increasing dose, frequency and \or duration of the DS without a physician advice. Safety and awareness about Ds are studied in few studies one of which has found that majority of participants consider that DS are pretested for safety [36] and are willing to use without prescription.

## 5. Conclusion

Our study revealed that dietary supplements consumption is more prevalent among children whose parents are highly academic educated and hence working at the scientific sector. In addition, health promotion and support immunity are the two main reasons behind supplement use. Twenty percent of respondents (parents) are not aware about the risks of elevating the dose or duration of consumption. Moreover, 27.3% of them are lacking the knowledge that dietary supplements have side effects. Since parents have the decision to give dietary supplements to their children they need to be well educated about the wise use of such products .Thus, awareness education program for parents or caregivers on the risks of dangers of dietary supplement use is needed urgently.

## Strength

The strength of this study is that it is the first study to document the use of DS in Egypt during the COVID -19 or even before. It was done with no fund from any organization.

## Limitations

The present study experienced some difficulties and in turn limitations. Sample size is small as it is the first online study to be performed among NRC committee during the lock down period where people were still in the shock stage unable to perform and work. However, we hope to expand such study to be performed among children in another study enrolling larger numbers.

## Funds

None.

## Conflict of Interest

None.

Finally, this research paper is dedicated to the soul of Professor Amal Hassanien who worked a lot to start this research and didn't have chance to see its finalization, May her soul rest in peace.

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