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Effect of Health Education Program to Improve Awareness about Vitamin D Deficiency on Preparatory School Students in Port-Said City, Egypt

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ABSTRACT

To increase the awareness about Vitamin D deficiency, a pre- and post-intervention study design was performed using a health education program among 428 students from eight public preparatory schools in Port Said City. The students' general knowledge and nutritional knowledge was positively increased from 74% to 84%. There is a statistically significant difference between pre-test and post-test of general knowledge of vitamin D deficiency, in addition to nutritional knowledge (P-value ≤ 0.05). However, there is no statistically significant difference in practice toward Vitamin D deficiency (P-value ≥ 0.05). The general knowledge and practice of vitamin D deficiency after intervention have a statistically significant linear relationship (p < 0.001). The direction of the relationship is positively correlated and tend to increase together. The health education program was effective to increase both the general, nutritional knowledge and practice toward a better lifestyle.

Keywords: Vitamin D deficiencies, health Education, nutrition, Port Said, knowledge, Practice
Abbreviation: KAP: Knowledge, attitude, and practice, **PHC:** primary Health Care.
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INTRODUCTION

Vitamin D has some roles in the body, including modulation of cell growth, neuromuscular and immune function, and reduction of inflammation. Vitamin D plays a substantial role in the regulation of calcium and maintenance of phosphorus levels in the blood, two factors that are extremely important for maintaining healthy bones (Ware, 2017). It is also needed for bone growth and bone remodeling by osteoblasts and osteoclasts. Without sufficient vitamin D, bones can become thin, brittle, or misshapen (Del Valle et al., 2011). A major source of vitamin D for most humans comes from exposure of the skin to sunlight typically between 1000 – 1500 hour in the spring, summer, and fall (Holick et al., 2011), however fatty fish and fortified dairy products are considered of food intake (Kennel et al., 2010).

Several risk factors are associated with hypovitaminosis

D in developing countries. Female sex and particular age groups (neonates, pre-school children or the elderly) were the most consistently reported risk factors for hypovitaminosis D. Dark-skinned individuals require six times of sun exposure than light-skinned individual (SA Health and Safety, 2016), also concealing clothing style was a consistent predictor of low vitamin D levels in the Middle East, East Asia and North Africa (El-Hajj, 2009). Tunisian children and adolescents, are exposed to a high risk of vitamin D inadequacy despite living in a sunny climate (Bezrati et al., 2016). Among Egyptian prepubescent children, there is a high prevalence of vitamin D deficiency especially among children which may increase the risk of many chronic diseases in adulthood (Abu Shady et al., 2016). The aim of this study is to assess the knowledge and practice of Vitamin D deficiency before and after a health education program in between.

MATERIAL AND METHODS

A pre and post-intervention study design was carried out in selected public preparatory schools representing the three educational administrations of Port Said City, from February to March 2018. The sample size was 5% of the total population, which was equal to 400 students. To compensate for none or incomplete response, 428 students were recruited. Participants were selected based on non-proportional stratified random sampling, which was conducted in eight public preparatory schools (four for girls; Port Said, Al-Qanah, Al-Malek Faisel and Gamal Abdelnasser, three for boys; Port Said, Al-Qanah & Al-Nasr and one mixed school; Port Said experimental) in Port Said City. A structured interviewed questionnaire was adapted from an Iranian study (D-KAP-38) (Amiri et al., 2017). The questionnaire was translated into Arabic by researchers to be used for easier communication with the students. The questionnaires were filled out during the interview with each student after explaining the aim of the study. The health education program was for one day. The study was conducted in three phases:

Phase 1 (pre-intervention): a collection of baseline data through a structured interview questionnaire with students in public preparatory schools to assess their knowledge and practice towards Vitamin D Deficiency. Five to six researchers per school were assessing the students.

Phase 2 (intervention): the health education program was provided by two to three researchers per one school as oral presentation session which, included the importance of vitamin D and its role in the body. Besides, the factors causing Vitamin D deficiency, symptoms, complications and prevention (food, fortified food, supplement, and sun exposure).

Phase 3 (post-intervention): a final assessment of health education program effects on the students' knowledge and practice through the same questionnaire.

The questionnaire was composed of four sections:

Socio-demographic data: Name, age, gender, address.

Participants' general knowledge: Composed of 11 questions about risk factors of vitamin D deficiency, risk groups, protective factors and symptoms; all questions had three answers that were scored as 2 points for yes, 1 point for I don't know, 0 point for no. The total score ranged from 0 to 22 points. The knowledge score median was used as the cutoff point of defining good and poor knowledge; a score equal to the median to more was considered as "good knowledge", while "poor knowledge" was defined as a score below the median (Amiri et al., 2017).

Participants' nutritional knowledge: Composed of five questions; the first question had three answers that were scored as 2 points for yes, 1 point for I don't know, and 0 point for No. The other four questions had also three answers but were scored as 2 points for No, 1 point for I don't know, and 0 point for Yes. The total score ranged from 0 to 10 points. The nutritional knowledge score median was used as the cutoff point of defining good and poor nutritional knowledge; a score equal to the median to more was considered as "good nutritional knowledge", while "poor nutritional knowledge" was defined as a score below the median (Amiri et al., 2017).

Participants' practice: There were 10 questions, five of them were related to vitamin D intake and the other five were related to sun exposure. The first six questions were scored as 5 points for always, 4 points for often, 3 points for sometimes, 2 points for rarely, and 1 point for never. The other four questions were scored reversely as 5 points for never, 4 points for rarely, 3 points for sometimes, 2 points for often, and 1 point for always. The total score ranged from 10 to 50 points. Like the knowledge score, a "good practice" was defined as scores equal to or more than the median practice score, and a score below that was defined as "bad practice"(Amiri et al., 2017).

Data analysis

Data was reviewed for accuracy and completeness. SPSS software version 20 was used for data processing. Descriptive statistics were applied in numerical form; mean (standard deviation) for quantitative data and number (%) for qualitative data. A paired sample T-test was used to compare pre & post-intervention knowledge and practice. Chi-square was used to detect associations between different outcomes. A p-value of ≤ 0.05 was considered statistically significant.

Ethical consideration

Approval for this study was obtained from the faculty of medicine Port Said University, in addition to approval from educational administrations and schools. Explanation of the research objectives and its relevance was conveyed before, at the time of data collection, and before health education. Informed consent was obtained from the participants. The participants had the right to

Table 1: Association between the gender of our students and general knowledge, nutritional knowledge and practice during the Pre interventional stage (n=428).

		Gender			
		male	**female**	**Total**	**P value**
Level of General knowledge	Good	103 (24%)	118 (27.6%)	221 (51.6%)	
	Poor	109 (25.5%)	98 (22.9%)	207 (48.4%)	0.124
Nutritional Knowledge	Good	144 (33.6%)	122 (28.5%)	266 (62.1%)	
	Poor	68 (15.9%)	94 (22%)	162 (37.9%)	0.017*
Practice	Good	150 (35%)	92 (21.5%)	242 (56.5%)	
	Bad	62 (14.5%)	124 (29%)	186 (43.5%)	0.0001*

*Chi-Square test is statistically significant at level of confidence 95%

Table 2: Post intervention association between the gender of students, general knowledge, nutritional knowledge and practice (n=428).

Knowledge (post) and gender association		**Gender**			
		male	**female**	**Total**	**P value**
Level of General knowledge	**good**	168 (39.3%)	193 (45%)	361 (84.3%)	
	poor	44 (10.3%)	23 (5.4%)	67 (15.7%)	0.005*
Nutritional Knowledge	**Good**	204 (47.6%)	183 (42.8%)	387 (90.4%)	
	Poor	8 (1.9%)	33 (7.7%)	41 (9.6%)	
Practice	**Good**	133 (31%)	87 (20.4%)	220 (51.4%)	
	Bad	79 (18.5%)	129 (30.1%)	208 (48.6%)	0.0001*

*Chi-Square test is statistically significant at level of confidence 95%

Table 3: Relationship between pre-intervention & post-intervention of vitamin D deficiency: according to general knowledge, nutritional knowledge and practice of habits.

	Pre intervention	**Post intervention**	**Paired t test**	**p-value**
General knowledge about vit. D	74.48%	84.23%	11.059S	0.0001
Nutritional knowledge about vit. D	34.88%	67.03%	19.048	0.0001
Practice towards vit. D	68.22%	69%	1.159	0.247

refuse participation or withdraw at any time without any obligation or stating any reason. Participants' confidentiality and anonymity were assured by assigning each participant with a code number for the purpose of analysis only. Data was kept safe and no personal data was published.

RESULTS

A total of 428 students with a median age of 14 years, participated in the study. The Association between the gender of students and general knowledge, nutritional knowledge and practice during the Pre interventional stage (n=428) is shown in Table 1. The post-intervention association between the gender of students, general knowledge, nutritional knowledge and practice (n=428) is shown in Table 2. There was a significant increase in general knowledge of vitamin D deficiency, in addition to nutritional knowledge (P-value ≤ 0.05); in contrast, there isn't a significant change in habits related to Vitamin D deficiency (P-value ≥ 0.05) as shown in Table 3. The association between general knowledge and practice during the pre-intervention compared to the post-intervention is shown in Tables 4a and 4b.

DISCUSSION

With regards to the general knowledge of vitamin D, 74.48% in this study had good knowledge in the pre-intervention phase, and the post-intervention increased to 84.23%; the pre-intervention knowledge is convergent to another study done in Dammam PHC Saudi-Arabia as 62% had excellent to good knowledge; which can be attributed to the relevance of the problem in both countries (Middle East countries) (Babli et al., 2015).

As regards to the nutritional knowledge of vitamin D, 34.88% of the participants in this study had good knowledge regarding the proper nutrition of vitamin D during the pre-intervention phase, while the post-intervention raised to 67.03%. This wide gap in their knowledge indicates the importance of educational programs for elevating the awareness, however, a study performed in Saudi Arabia revealed that low levels of knowledge about vitamin D have contributed to low

Table 4a: Association of the general knowledge and practice during the pre-intervention.

		Practice (pre-intervention)			
		good	**poor**	**Total**	**P-value**
General Knowledge (pre-intervention)	good	125	96	221	
	poor	117	90	207	
Total		242	186	428	0.993*

*Chi-Square test is statistically significant at level of confidence 95%.

Table 4b: Association of the general knowledge and practice during the post intervention.

		Practice (post-intervention)			
		good	**poor**	**Total**	**P-value**
General Knowledge (post-intervention)	good	172	189	361	
	poor	48	19	67	
Total		220	208	428	0.000*

*Chi-Square test is statistically significant at level of confidence 95%.

consumption of vitamin supplementation, including vitamin D, calcium, multivitamin, and calcium supplements with vitamin D, and to the higher prevalence of vitamin D deficiency (Babli et al., 2015). It can be suggested that the main cause of vitamin D deficiency is the low knowledge and awareness about vitamin D. However, the culture of a country is an important aspect in their nutrition as a survey done in China regarding the consumption of foods rich in vitamin D and supplement use. The results showed that almost all of the students often consumed eggs every day, while only half of them consumed marine fish twice per month. Additionally, only 5.6 % of students used cod-liver oil, the most common vitamin D supplement (Zhou et al., 2016). Regarding the practice, the pre-intervention percentage of the practice in the study was 68.22% good, while the post-intervention percentage surged to 69%. These results are similar to many other surveys (despite having knowledge, the practice is very low) as in a KAP study was done for evaluation of sunlight exposure among Indian students, 64.2% students did not like going in the sun and the percentage of female students who disliked being exposed in the sun was significantly higher (71.1% and 51.6%, respectively; p=0.000) (Arora et al., 2016).

Conclusion

Health education program was effective to increase both the general, nutritional knowledge and practice toward Vitamin D deficiency.

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