Effect of Nutrition Health Education Module through design of Website on nutritional knowledge and practice of Deaf Students in Mansoura City

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ABSTRACT

Background: Nutritional knowledge is important issue because it influences healthy food choices and dietary pattern. Deaf students require specially developed nutrition education materials and programs that can be understood quickly and easily. **Aim:** The present study aimed to; explore effect of nutrition health education module through design of website channel on nutritional knowledge and practice of deaf students in Mansoura city. **Subjects and Method: Design:** a quasi-experimental research design with one group pre/post-test approach was used. **Setting:** the study conducted in Al-Amal school for deaf students in El Mansoura city. **Subjects:** included a purposive sample of 74 deaf students. **Tools:** Two tools were used for data collection consisted of; Deaf students' knowledge about healthy nutrition questionnaire, and Deaf Students' Health assessment questionnaire. **The Results**: 83.8% of the deaf students had poor levels of knowledge pre-intervention, which decreased to 8.1% had poor levels of knowledge post-intervention with statistically significant differences between total deaf students' knowledge levels pre- and post-intervention. 97.3% of the deaf students had poor levels of practice pre-intervention which decreased to only 6.8% had poor levels of practice post-intervention with statistically significant differences between total deaf students' practice levels pre- and post-intervention. **Conclusion**: the nutritional health education module through design website channel proved an invaluable resource for deaf students, significantly enhancing their knowledge and skills in the field of nutrition. **Recommendations**: to guarantee the program's efficacy and long-term effects, integrate nutritional health into deaf schools' activities. To ensure the program's efficacy and long-term effects, it is recommended that nutritional health be integrated into the activities of deaf schools.

Keywords: Deaf students, Health education model, Nutritional health.

INTRODUCTION

In Egypt it is estimated that over 1.2 million deaf/hard of hearing persons aged five and over. This has primarily because, especially in Upper Egypt most marriages are between close relatives, in addition to this, low level of pre- and post-natal care and during the delivery of the baby, as decrease well health awareness of the poor. "Centre Agency for Public Mobilization and Statistics (CAPMAS, 2018). Deafness can be caused by hereditary and non-hereditary genetic factors or by certain complications during pregnancy and childbirth, including: infections during pregnancy; use of particular drugs during pregnancy, low birth weight, a lack of oxygen at the time of birth. Among children, chronic otitis media is a common cause of hearing loss (Palupi, Putri, & Sitoayu, 2021).

The term "deafness" or "hearing loss" means loss of function of varying intensity to all parts of the ear and the auditory pathway. By 2050 nearly 2.5 billion people are projected to have some degree of hearing impairment and at least 700 will require hearing rehabilitation (Abdel-Wahab, El-Hameed, Sabry, & Mohy-Eldeen, 2023). They often use sign language for communication. According to the World Health Organization Over 5% of the world's population or one in every ten people – will have disabling hearing loss (WHO, 2020).

The most common causes of hearing impairment and deafness are considered heredity, congenital defects, viral infection, accidents, tinnitus condition, medications that may lead to hearing damage and prolonged exposure to loud noise. The most common symptoms that appear on school age students; doesn't react to loud sounds, does not seek out or detect where sound is coming from, shows signs of behavioral problems or social difficulties, experiences problems keeping up at school or grades slipping, is easily frustrated or experiences communication breakdowns, cannot understand what saying unless looking directly at the face of speaker, being exhausted at the end of school from concentrating to understand speech (Haile, et al., 2021).

Nutritional knowledge is important issue because it influences healthy food choices and dietary pattern. Children with hearing impairment require specially developed nutrition education materials and programs that can be understood quickly and easily. The major challenge facing deaf students is communication. The gap is due to the differences in personality, intelligence, nature and degree of deafness, amount and type of

residual hearing, extent of benefit derived from amplification by hearing aid, family environment, and age of onset of impairment. Therefore, deaf students require support in these four areas i.e. communication and interaction, cognition and learning, behavioral, emotional and social development, and sensory or physical aspect of development (Mohamad, Syed, Muhammud, & Mohd, 2020).

Irregular meal patterns and consumption of high caloric snakes and fast food may contribute to overweight, obesity and other chronic diseases. This dietary pattern of deaf students may have long-term health implications into adulthood period (Altoani, 2020). Knowledge, attitudes, beliefs, and food preferences are modifiable personal factors that influence eating behavior (Jalkhi, 2023). adolescents may try to modify their eating behavior by obtaining nutritional information from numerous channels, but not all of these channels are valid sources. So that valid sources of health information should be provided for young adults via their preferred channels. The interacting via internet and web-based learning systems is an effective learning channel in the 21st century (El-Refaay, Ahmed, & Salem, 2017).

Community Health Nurse plays an important role in improving knowledge of deaf students. The School Health Nurse as a most important role of Community Health Nurse plays a vital role on the front lines to improve the physical, psychological, social health and educational process for students with deafness (Alabama Institute for Deaf and Blind, 2021). Community Health Nurse promote the health and safety, intervene with actual and potential health problems, provide case management services, collaborate with others to build student and family capacity for adaptation, self-management and learning (Ellala, Abuawad, Abdel-Hadi, & Kaba, 2024).

Significance of the study

It was attributed to deafness is the most common sensory impairment in human beings, with significant social and psychological implications. The prevalence of deafness in Egypt 16.02% is higher than many other developing countries. The rate is also higher than that of Oman 5.53% and Saudi Arabia 13% which as Arab countries has ethnic, cultural and traditional similarities to Egypt (Ramadan, Sadek, Said, & Fathy, 2023). On the other hand, students practice unhealthy eating patterns such as meal skipping, snacking, and fast-food consumption. Eating pattern could be modified by providing valid nutritional knowledge. Adolescent students used to obtain information

from different internet websites (El-Refaay, et al., 2017). Therefore, the present study was carried out to explore the effect of nutritional health education module for deaf students through design website channel at Mansoura City.

The study aims to

Explore the effect of nutrition health education module through design of website on nutritional knowledge and practice of deaf students in Mansoura city.

Objectives

1. Assess deaf student's healthy nutrition knowledge.
2. Design of website channel to using health education module for deaf students about healthy nutrition.
3. Design of health education module for deaf students about healthy nutrition.
4. Implement health education module for deaf students about healthy nutrition.
5. Evaluate effect of health education module on deaf students' knowledge about the nutritional health.

Research hypothesis

Nutrition health education module through design of website will increase nutritional knowledge and practice of deaf students in Mansoura city.

SUBJECTS AND METHOD

A. Technical design

This design includes a description of the research design, setting, subjects, and tools of data collection.

Study design

A quasi-experimental research design with one group pre/post-test approach was utilized to achieve the aim of this study.

Study setting

The present study was conducted at Al-Amal school for the deaf in El Mansoura city which affiliated to Egyptian ministry of education, El-Dakahlia Governorate. The school includes all levels of secondary schools (two classes for the first year including 29 students, two classes for the second year including 26 students, two classes for the third year including 23 students.

SUBJECTS

Sample

The present study was included a purposive sample of all deaf students from Al-Amal secondary school for the deaf in El Mansoura city with number of 78 students.

The inclusion criteria:

1. Both sexes .
2. Students age from 15-20 .
3. All levels of secondary school .
4. Students are free from psychological diseases.

Tools for data collection

Two tools were used for data collection:

Tool I: Assess deaf students' knowledge: That consisted of three parts as follow:

Part (1): Students' sociodemographic data:

It was adopted from (Fahmy and ElSherbeiny, 1983) and was translated into sign language by a specialist in sign language for the deaf students. This deaf students' sociodemographic data such as name, age, gender, class of study, residence, social level, education level of parents, work of parents, number of family, relativity between parents, and number of brothers and sisters.

Part (2): Students' Knowledge about Healthy Nutrition Questionnaire:

It was adopted by El-Refaay, et al., (2017) and adapted by the researcher and was translated into sign language by a specialist in sign language for the deaf students to assess deaf students' knowledge about healthy diet and its components. The questionnaire was consisted of 22 questions classified into three categories as the following: **The basic concept of nutrition and diet-related diseases category** consisted of ten questions e.g., definition of healthy food, components of an integrated healthy food, effect of daily food on health. **Nutritional label and purchasing healthy packaged food category** consisted of four questions e.g., the nutritional information on the canned food labels contains, written on the package rich in vitamin C, and define organic foods. **Nutritional facts category** consisted of eight questions e.g., foods is rich in protein, foods is rich in protein, foods is rich in carbohydrates, foods is rich in sugars best sources of vitamin A, best sources of vitamin (B2), best sources of vitamin (B6), best sources of vitamin C, and prefer fast food and sweets.

Scoring system for part (2): Knowledge obtained from the deaf student was compared with a model key answer. The total scores were divided into percentage and interpreted as follows: poor level = scores less than 50% of total scores, fair level = scores 50% to 65% of total scores, and good level= scores more than 65% of total scores (El-Refaay, et al., 2017).

Part (3): Students' Dietary Practices Self-Administered Structured Questionnaire (reported practice)

This questionnaire adapted by El-Refaay, et al., (2017) was used to assess the student's dietary practices. The questionnaire was composed of 17 questions classified into two categories as the following: **nutritional habits favorite diet category** included one question, **nutritional habits per day category** included five questions, and **student daily activity category** included ten questions.

Scoring system for part (3): The total scores was considered adequate practice if the percent score was 65% and more. While considered inadequate practice if the percent score was less than 65% (El-Refaay, et al., 2017).

Tool II: Students' Health assessment sheet:

This tool developed by the researcher to assess deaf students' health; it was included deaf students' weight, height, and calculate body mass index by researcher.

$$\textbf{BMI} = \frac{\text{(Body weight in kg.)}}{\text{(High in m)}^2}$$

B- Operational design

The study field of work was carried out through the following phases:

Tools validity

It was ascertained by a panel of experts consisting of five experts from faculty of nursing in Port Said University (three experts from Family & Community Health Nursing, one expert from Pediatrics nursing, and one expert from nutrition Specialist). Professors reviewed the instruments for clarity, relevance, comprehensiveness, and understanding of applicability. Comments and suggestions of the experts were considered, and necessary modifications and clarifying of the items were made accordingly.

Tool reliability

The reliability of tools used in this study by the Cronbach's alpha coefficient test to assess the internal consistency of the study tools. The internal consistency reliability for knowledge tool was 0.849, & practice tool was 0.865 which refers to be reliable.

Pilot study

Before entering the actual study, the pilot study was conducted on 10% (seven deaf students) of the sample to assess the clarity, practicability, and feasibility of the tool and to estimate the proper time required for interview. The pilot was collected in one month from the beginning of November to the end of the same month. The researcher selected 10% from each class randomly who match with eligibility criteria and no modification in any of the content of the tool was found. Those who shared in the pilot study were included in the main study sample.

Field work

The collection of the data covered a period of three months from 1st of October 2021until the end March of 2022 (one month for the permission and one month for pilot study collection, and four months for implementation of the program). The study was implemented through the following four phases:

Phase I (Assessment Phase): Before conducting the study, an oral consent has been taken from students to participate using the data collection forms served as a pre-test for baseline comparison with post-test data. It also helps the researcher to identify the educational needs of the participants in order to design the educational intervention. Before starting up website channel design and planning, the researcher met the students and fill out the questionnaire to assess deaf students' socio-demographic data, assess students' nutritional knowledge, reported practice, and health measurement Body Mass Index (BMI). data collection lasted about one hour to be filled and this was with a teacher to interpret in sign language. The data obtained during this phase was considered the basis for the evaluation of the educational sessions. The researcher selected a platform and created a channel of own to display the content on this platform. The platform was a set of interactive services over the Internet that provides learners with access to the information contained in this study through a channel that displays videos translated into sign language, and this video was translated into sign language by Mss. Dalia Gaanim a sign language expert for the deaf https://www.youtube.com/@user-cw3mk7no9r

Phase II (Planning Phase): Based on the information obtained from the initial assessment, in addition to recent literature, the researcher designed an online nutritional health education module under the guidance of the supervisors. The sessions included content related to two videos was 12 minutes long for general knowledge about healthy nutrition and two videos was 13 minutes long for student's dietary practices and one video was 6.30 minutes long about food label. After developing the educational module translated to sign language, it was revised by a panel of experts in the field of Community Health Nursing, the Faculty of Nursing. Each group of students watched the five videos during one hour.

Phase III (The educational module implementation): The subjects were divided into small groups (10 groups), and each group contained (7-8) students. The researcher attended the school (3 days) a week (Sunday, Monday, Tuesday) from 9 am to 12 pm.

The module was conducted through three sessions each session took about one hour ,each group obtained the three sessions over week total sessions (30 hours) one session for pre-test, one session for watched the five videos and one session for post-test. The researcher took student from the activity class to not waste time to collect the data and apply the educational intervention.

The link to the channel was presented to students in a clear and concise form to be used when needed at any other time. Each session started by a summarized of the objectives of the presented videos, then the videos are shown. The researcher doesn't ignore motivation and reinforcement techniques. Students were allowed to ask for any interpretation, or explanation of any item included in the video. All explanations, an orientation and summary were done by the researcher and the sign language teacher for all sessions. The duration of sessions implementation was two months (from the first of December 2021 till the end of March 2022).

Phase IV (***Evaluation phase***)**:** After the implementation of the online nutrition health education module, a post-test was done to evaluate the effect nutrition health education module. The post-test was done at the end of the nutrition health education module by using the same tools used in the pre-test.

Ethical considerations

The study protocol was approved by the Research Ethics Committee (REC), Faculty of Nursing/ Port Said University with code number (NUR 5/11/2021) (31). An approval had been obtained from Al-Amal school for the deaf director to conduct the study after illustrating the purpose and process of the study. The researcher informed the participants that they can withdraw from the study at any time they wish to do so without any problem. The researcher has ensured the maintenance of anonymity and confidentiality of participants. Moreover, the participants have been assured about discretion regarding the collected information, and that they shall only be used for study purposes.

C- Administrative design

An official letter containing the title and the aim of the study was sent from the Dean of the Faculty of Nursing - Port Said University to director of the study setting to

obtain approval from Al-Amal school for the deaf administrator for data collection at the above-mentioned settings.

D. Statistical design

All statistical tests were conducted using SPSS for windows version 25.0 (SPSS, Chicago, IL). Continuous data were normally distributed and were expressed in mean ±standard deviation (SD). Categorical data were expressed in frequency and percentage. The comparisons were determined using paired t test for two variables with continuous data, Chi-square test was used for comparison of variables with categorical data. Pearson correlation analysis was used for assessment of the interrelationships among quantitative variables. To identify the independent predictors of the students' knowledge & practice multiple linear regression analysis was used after testing for normal distribution, normality, and analysis of variance for the full regression models was done. Statistical significance was set at $p < 0.05$.

Limitation

All students of Al-Amal secondary school for the deaf in El Mansoura city (number of students = 78). However, when conducting the questionnaire, it was found that there are four students who are not available, due to their non-attendance and their refusal to study after the Corona pandemic.

RESULTS

Table (1) displays distribution of the study sample according to socio-demographic characteristics. It revealed that 64.9% of the studied students were males, with mean age ±SD of 16.581 ± 1.292 years. In addition, 40.6% of them were at third level of education, 87.8% of them were rural residence, 74.3% of them had 3-5 family members, 51.4% of them had 3-5 brothers, and similarly in the center rank, 40.5% of them their father was middle education. Moreover, the findings implied that 33.8% of them their mother were illiterate. Finally, the same table clarified that, 55.4% of them their fathers were work, 75.7% of them their mothers weren't work, 79.7% of them responded by "No" regarding mother father relationship, and 54.1% of them had enough income.

Table (2) shows distribution of the study sample according to family medical history. It revealed that 89.2% of the studied students were medically family history free, and only 1.4% of them had renal diseases & Osteoporosis respectively, 73% of them reported that they weren't had deaf in their family, and only 21.5% of them had brothers &sisters with deaf. showed distribution of the study sample according to student Body mass index. It revealed that 47.3% of the studied students had normal weight, 41.9% of them were overweight, then 6.7% of them were obese, and only 4.1% of them were under weight.

Figure (1) illustrates the total students' knowledge levels before and after the intervention. It was demonstrated that 83.8% of the studied student had poor levels of knowledge before the intervention, then meanwhile were only 8.1% had poor levels of knowledge after the intervention with a statistically significance differences detected between total students' knowledge levels before and after the intervention as *(P- value* <0.0001).

Table (2) reveals the total students' practice levels before and after the intervention. It was demonstrated that 97.3% of the studied student had poor levels of practice before the intervention and were only 6.8% had poor levels of practice after the intervention with a statistically significance differences detected between total students' practice levels before and after the intervention as *(P- value* <0.0001).

Table (3) illustrates the correlation between students' total knowledge & practice level. It was demonstrated that there was a strong positive correlation between students' knowledge & practice as increasing knowledge levels were associated with increasing practice levels with a statistically significance relation detected between students' total knowledge and practice levels before and after the intervention as *(P- value* <0.0001).

Table (4) illustrates multilinear regression of student sociodemographic characteristics on total knowledge (**Pretest**). It was demonstrated that the father occupation was the main predictor that effect on the student's total knowledge level pretest as p=.041.

Table (5) represent the multilinear regression of student sociodemographic characteristics on total knowledge (**Posttest**). It was demonstrated that the gender mother occupation, father occupation, and income were the main predictors that effect on the student's total knowledge level posttest as p=.011, .021, .024, and .021respectively.

Table (6) shows multilinear regression of student sociodemographic characteristics on total practice (pretest). It was demonstrated that the gender, and education were the main predictor that effect on the student's total practice level pretest as p=.020 and .000 respectively.

Table (7) illustrates multilinear regression of student sociodemographic characteristics on total practice (**posttest**). It was demonstrated that the gender, age and education were the main predictor that effect on the student's total practice level posttest. As p=.025, .031, and .000 respectively.

Table (1): Distribution of the study sample according to socio-demographic characteristics (n=74).

Items	No	%
Gender		
• Male	48	64.9
• Female	26	35.1
Mean age ±SD	16.581 ± 1.292	
Education		
• First	22	29.7
• Second	22	29.7
• Third	30	40.6
Residence		
• Urban	9	12.2
• Rural	65	87.8
Family members		
• 3-5	55	74.3
• 6-8	18	24.3
• ≥ 9	1	1.4
Number of brothers		
• 0-2	34	45.9
• 3-5	38	51.4
• ≥ 6	2	2.7
Student rank		
• Oldest	30	40.5
• Center	38	51.4
• Youngest	6	8.1
Father education		
• Illiterate	27	36.5
• Read & write	6	8.1
• Basic	4	5.4
• Secondary	30	40.5
• University	7	9.5
Mother education		
• Illiterate	25	33.8
• Read & write	18	24.3
• Basic	3	4.1
• Secondary	23	31.1
• University	5	6.7
Mother occupation		
• Not work	56	75.7
• Work	18	24.3
Consanguinity		
• Yes	15	20.3
• No	59	79.7
Income		
• Enough	40	54.1
• Not enough	34	45.9

Table (2): Distribution of the study sample according to Family medical history& student Body mass index (N=74).

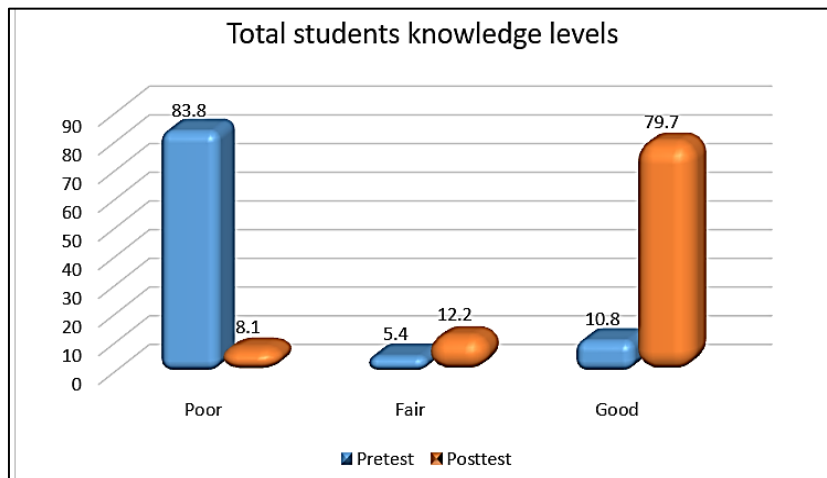| Items	No	%
Family history		
• Medically free	66	89.2
• Hypertension	3	4
• Osteoporosis	1	1.4
• Obesity	3	4
• Renal diseases	1	1.4
Who is deaf in the family?		
• None	54	73
• Parents	3	4.1
• Brothers/sisters	16	21.5
• Relatives	1	1.4
Body mass index		
▪ Under weight	3	4.1
▪ Normal weight	35	47.3
▪ Over weight	31	41.9
▪ Obesity	5	6.7

Figure (1): Total students' total knowledge levels pre- and post-session

Table (3): Distribution of the study sample according to total student practice levels (N=74).

Levels	Pretest		Posttest		Significance
	No	**%**	**No**	**%**	
Poor	72	97.3	5	6.8	X²= 122.753 p=0.000**
Fair	2	2.7	9	12.1	
Good	0	0	60	81.1	

Table (4): correlation between students' total knowledge & practice level

Variables	r/p	Knowledge posttest	Practice pretest	Practice posttest
Knowledge pretest	r	-.196-	.406**	-.277*
	p	.094	.000	.017
Knowledge posttest	**r**		**-.092-**	**.400****
	p		**.434**	**.000**
Practice pretest	**r**			**-.141-**
	p			**.232**

Table (5): Distribution of the study sample according to multilinear regression of student sociodemographic characteristics on total knowledge (Pretest)

Model	Unstandardized Coefficients		Standardized Coefficients	T	p.
	B	**Std. Error**	**Beta**		
Gender	-.282-	1.009	-.036-	-.279-	.781
Age	-.413-	.473	-.141-	-.874-	.386
Education	1.349	.753	.297	1.791	.078
Residence	-.486-	1.530	-.042-	-.318-	.752
Family members no.	-1.964-	1.105	-.246-	-1.778-	.080
No of brothers	1.442	1.170	.209	1.233	.222
Student rank	-.992-	.922	-.162-	-1.077-	.286
Father education	-.153-	.401	-.061-	-.382-	.704
Mother education	-.308-	.402	-.114-	-.766-	.447
Father occupation	-1.288-	.618	-.281-	-2.085-	.041*
Mother occupation	-2.039-	1.095	-.232-	-1.862-	.067
Consanguinity	-1.396-	1.115	-.149-	-1.252-	.216
Income	-.089-	1.083	-.012-	-.082-	.935

Table (6): Multilinear regression of student sociodemographic characteristics on total knowledge (Pretest)

Model	Unstandardized Coefficients		Standardized Coefficients	t	p.
	B	Std. Error	Beta		
Gender	1.221	.463	.320	2.635	.011*
Age	-.255-	.217	-.180-	-1.173-	.246
Education	.338	.346	.154	.978	.332
Residence	.051	.703	.009	.072	.943
Family members no.	-.419-	.507	-.109-	-.825-	.413
No of brothers	-.061-	.537	-.018-	-.113-	.910
Student rank	.064	.423	.022	.151	.881
Father education	.260	.184	.215	1.412	.163
Mother education	-.021-	.185	-.016-	-.115-	.909
Father occupation	-.675-	.284	-.305-	-2.380-	.021*
Mother occupation	-1.167-	.503	-.275-	-2.322-	.024*
Consanguinity	-.827-	.512	-.183-	-1.615-	.112
Income	1.177	.497	.322	2.366	.021*

Table (7): Multilinear regression of student sociodemographic characteristics on total practice (Pretest)

Model	Unstandardized Coefficients		Standardized Coefficients	t	p.
	B	Std. Error	Beta		
Gender	-2.387-	.997	-.244-	-2.393-	.020*
Age	.062	.467	.017	.134	.894
Education	-3.205-	.744	-.572-	-4.306-	.000**
Residence	.136	1.512	.010	.090	.928
Family members no.	1.746	1.091	.177	1.600	.115
No of brothers	.000	1.156	.000	.000	1.000
Student rank	-.150-	.911	-.020-	-.164-	.870
Father education	-.023-	.396	-.007-	-.057-	.955
Mother education	-.254-	.398	-.076-	-.639-	.526
Father occupation	-.564-	.610	-.100-	-.924-	.359
Mother occupation	1.358	1.082	.125	1.255	.214
Consanguinity	.531	1.102	.046	.482	.631
Income	1.495	1.070	.160	1.397	.168

Table (8): Multilinear regression of student sociodemographic characteristics on total practice (Pretest)

Model	Unstandardized Coefficients		Standardized Coefficients	t	p.
	B	**Std. Error**	**Beta**		
Gender	-1.306-	.570	-.255-	-2.293-	.025*
Age	.591	.267	.310	2.214	.031*
Education	-2.026-	.425	-.689-	-4.766-	.000**
Residence	-.129-	.864	-.017-	-.149-	.882
Family members no.	.142	.623	.027	.228	.821
No of brothers	.551	.660	.123	.834	.407
Student rank	.639	.520	.161	1.229	.224
Father education	-.199-	.226	-.123-	-.879-	.383
Mother education	.047	.227	.027	.206	.838
Father occupation	.098	.349	.033	.282	.779
Mother occupation	-.394-	.618	-.069-	-.637-	.526
Consanguinity	.152	.629	.025	.241	.810
Income	-.051-	.611	-.010-	-.084-	.933

DISCUSSION

The present study was carried out to explore the effect of nutritional health education module for deaf students through design website channel at Mansoura City. It was attributed to deafness is the most common sensory impairment in human beings, with significant social and psychological implications. The prevalence of deafness in Egypt (16.02%) is higher than many other developing countries. The rate is also higher than that of Oman (5.53%) and Saudi Arabia (13%) which as Arab countries has (ethnic, cultural and traditional similarities to Egypt) (Ramadan, Sadek, Said, & Fathy, 2023).

Regarding the studied deaf students' body mass index, it was revealed that the highest percent was nearly half of the studied students had normal weight, then more than two fifth of them were overweight. Whereas, the minority of them were obese. This result in the same line with Sopeah (2024) in Egypt who studied the effect of intake pecan nuts on improving the nutritional, behavioral and cognitive status of deaf students and reported that BMI of the studied students was normal and ranged 21-21.1% pre and post dietary intervention respectively. Similarly, study done by El-Refaay, Ahmed, & Salem, (2017) who studied development of web-based nutritional health education module and

revealed that 34.3% of the students were overweight and only 7.4% of them were obese. It may due to majority of the sample resident in rural area.

Regarding to deaf student's healthy nutrition knowledge, the present result showed that there was a statistically significance differences detected between the studied deaf students' total knowledge pre- and post-intervention. As observed, pre-intervention most of the deaf students had poor total knowledge which improved post-intervention to more than three quarters of them had good knowledge. The present results similar to a study conducted by Glorioso, Arevalo, Decena, Jolejole, and Gonzales (2022) in Philippines which study titled developing and pre-testing of nutrition cartoon video to promote healthy eating among 30 deaf students and reported that the intervention had positive effect on students' knowledge. Moreover, the present findings agreed with Altoani (2020) in Khartoum state who study titled impact of educational module for deaf students' knowledge regarding healthy food ingredients among 144 deaf students, and illustrated that there was significant differences in the experimental students group nutrition total knowledge before and after attending educational session where the mean value located in the fair range according to the tripartite Likert test of 1.67 - 2.33, and posttest where majority of students' responses in the range between 2.34 -3 and indicate to good knowledge.

This might be due to pre-intervention the studied deaf students not receiving any health education regarding healthy nutrition before implementing the current module.

Regarding deaf students' practice, the present results showed that there was a statistically significance differences detected between the studied deaf students' total practice pre- and post-intervention. It was revealed that the majority of the studied deaf students had poor practice pre-intervention which improved post-intervention to the most of them had good practice. The present result agreed with those of Ramadan, et al. (2023) in Egypt who studied health educational program for students with hearing impairment and deafness regarding their quality of life and concluded that health educational program succeeded to improve practices and attitudes of studied students with hearing impairment and deafness and revealed that 96% of the students had satisfactory practices post-program.

Also, the present findings similar to those of Kanfush, and Jaffe (2019) in USA who studied using video modeling to teach a meal preparation task to individuals with a

moderate intellectual disability and found that video modeling is an effective instructional strategy for teaching practices regarding meal preparation skills to adolescents with disabilities, the studied sample completed 95% of the observational practices independently after the training sessions. From the researcher point of view, this result may be due to the designed website provides practical guidance and resources that enable students to apply the knowledge gained from the educational module into their daily lives.

Concerning correlation between the study variables, the current findings illustrated that there was a strong positive correlation between students' knowledge & practice as increasing knowledge levels were associated with increasing practice levels with a statistically significance relation detected between students' total knowledge and practice levels before and after the intervention.

The present results in the same line with the study conducted by Demirci, Korkmaz, and Mutlu (2021) in Turkey which study titled determination of nutritional status of children with special needs and concluded that there was statistically significant relation between students' knowledge and their practices. Also, the current results supported by Ramadan, et al. (2023) who reported that students' knowledge was positively effect on their dietary habits. This might be due to attributed to the fact that; the knowledge was the baseline of practices, affect positively on their practices.

Relating to the multivariate linear regression analysis of student sociodemographic characteristics on total knowledge, it was demonstrated that the father occupation was the main predictor that effect on the student's total knowledge level pre-intervention. While, it was revealed that the gender, mother occupation, father occupation, and income were the main predictor that effect on the student's total knowledge level post-intervention. These findings were consistent with Birinci, and Saricoban, (2021) in Turkey who studied the effectiveness of visual materials in teaching vocabulary to deaf students and revealed that there was significant relation between students' knowledge and their sociodemographic characteristics regarding their gender and age, and with their parents' job.

Finally, according to the multivariate linear regression analysis of student sociodemographic characteristics on total practice, it was showed that the gender, and education were the main predictor that effect on the student's total practice level pre-

intervention. Moreover, it was demonstrated that the gender, age and education were the main predictor that effect on the student's total practice level post-intervention. In line with the current results, Kanfush, and Jaffe (2019) found positive correlation between students' practice and their sociodemographic characteristics regard to gender and age.

CONCLUSION

Based on the findings of the present study, it can be concluded that:

The findings of the current study highlight that the use of the health education module significantly improved students' knowledge and practice concerning nutrition health, thereby confirming the research's hypotheses. In addition, there was a statistical significance relationship and negative correlation between levels of knowledge in pretest, and posttest with r=-.196-, p=.406. Also, there was a statistically significant relation between levels of knowledge and levels of practice in posttest, as r=-.092-p=. 004.

RECOMMENDATIONS:

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

- Expand the educational sessions through offering continuous health education sessions to increase awareness about nutritional health in a different age group for deafness.
- Incorporate nutritional health into the activity of deaf schools to ensure the effectiveness and long-term impact of the module.
- Insert of sign-language interpretation in a cartoon video will help deaf and mute adolescent to understand the lesson it conveys.
- Further of study replication of this study on all deaf schools at the national level to generalize the results.

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تأثير برنامج تثقيف صحي غذائي للطلاب الصم من خلال تصميم قناة على شبكة المعلومات الدولية في مدينة المنصورة

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الـخـلاصـــــة

تُعتبر المعرفة بالغذاء الصحي قضية مهمة لتأثيرها على الخيارات الغذائية الصحية ونمط التغذية الصحي. ويحتاج الطلاب الصُم إلى برامج تثقيف صحي غذائي مطورة خصيصاً لهم لتيسير فهمها بسرعة وسهولة. ولذلك، تهدف هذه الدراسه إلى تحديد أثر برنامج تثقيف صحي غذائي للطلاب الصم من خلال تصميم قناة على شبكة المعلومات العنكبوتية في مدينة المنصورة. تم استخدام تصميم شبه تجريبي لإجراء الدراسة بمدرسة الأمل للصم بمدينة المنصورة؛ شملت الدراسة عينة غرضية مكونة من 74 طالباً من الصُم. وقد أظهرت نتائج الدراسة أن 83.8% من الطلاب الصُم الخاضعين للدراسة لديهم مستوى ضعيف من المعرفة بالتغذية الصحية قبل تطبيق البرنامج. والتي إنخفضت إلى 8.1% لديهم مستويات ضعيفة بعد البرنامج. كما أوضحت النتائج أن 97.3% من الطلاب الصُم لديهم مستوى منخفض من ممارسات التغذية الصحية قبل البرنامج والتي انخفضت بعد البرنامج الى 6.8% لديهم مستوى منخفض بعد تنفيذ البرنامج مع وجود فروق ذات دلالة إحصائية بين إجمالي مستويات المعرفة و الممارسة لدى الطلاب الصُم قبل وبعد تنفيذ البرنامج. وقد خلصت الدراسة إلى أن برنامج التثقيف الصحي الغذائي عن طريق شبكة المعلومات العنكبوتية كان له أثر ايجابي على معرفة وممارسة الطلاب الصُم بالصحة الغذائية. وأوصت الدراسة بدمج برامج التثقيف عن التغذية الصحية في الأنشطة التعليمية بمدارس الصُم لضمان فعالية البرنامج وتأثيره على المدى الطويل.

الكلمات المرشدة: الطلاب الصُم، برنامج التثقيف الصحي، تثقيف صحي، التغذية الصحية.