

## Effect of Educational Program Utilizing Audio and Braille Text on Knowledge and Practice of Visually Impaired Adolescent Girls Regarding Reproductive Health

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### Abstract

**Background:** Reproductive health of adolescent girls is a top priority in global programs. People with disability need access to health information and services across the life course for the same reasons as people without disability. **Aim:** To evaluate the effect of educational program utilizing audio and braille text on knowledge and practice of visually impaired adolescent girls regarding reproductive health. **Methods:** A quasi-experimental design (one group pre-posttest) was utilized. **Sample:** A purposive sample of ninety visually impaired adolescent girls between the ages of 11 and 18, who were willing to participate in the study, was recruited for the purpose of the current study. **Three tools were used for data collection:** Tool I, Visually Impaired Adolescent Girls Structured interview questionnaire. Tool II, visually impaired adolescent girls' knowledge assessment questionnaire related to reproductive health. Tool III, visually impaired adolescent girls' reported practices related to reproductive health. **Results:** After implementation of the educational program, all the studied visually impaired girls (100%) and (96.7%) of them had a satisfactory level of knowledge regarding reproductive health immediate posttest and follow-up respectively, compared to (41.1%) only in the pretest. Regarding the total practice scores, 31.1% of the girls only demonstrated appropriate practices in the pretest, increased to 94.4% in the immediate posttest and reached to 100% in the follow-up. A statistically significant relation was found between the levels of knowledge and practice during the pretest, immediate posttest, and follow-up with ( $p=0.0001$ ). **Conclusion:** The educational program significantly improved the knowledge and practices among the visually impaired girls regarding reproductive health. **Recommendations:** Similar educational programs should be implemented in visually impaired students' schools to enhance their knowledge and practices that related to reproductive health. Encourage collaboration between school nurses, and parents to provide comprehensive support for visually impaired girls in addressing their unique reproductive health needs.

**Keywords:** Reproductive health, visually impaired, Adolescent, knowledge, practice, Braille Text

### Introduction

Adolescence is a crucial phase in human development, marked by significant physical, hormonal, emotional, and cognitive (Cattelino, Chirumbolo, Baiocco, Calandri & Morelli, 2021). The stage between ages 10 and 19 represent a transitional period from childhood to puberty (Chahal et al., 2018). This transition is particularly critical for girls, as it not only signifies a move towards increased independence, but also constitutes a period of physical and psychological preparation for potential motherhood (Belayneh & Mekuriaw, 2019).

Globally, Disabled adolescents represent a globally underserved and vulnerable demographic, making up one-third of all disabled individuals, with the majority (over 80%) residing in developing countries

(International Online Resource Center on Disability, 2020). Despite their unique circumstances, their healthcare needs align with the general population, encompassing immunization, screening, sexual and reproductive health, and other standard healthcare services (Bright, 2018).

Reproductive health (RH) is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity in all matters relating to the reproductive system and to its functions and processes (WHO, 2020). RH is a crucial aspect, particularly for adolescents, as it is the optimal time to instill proper hygiene habits that yield lifelong benefits. Promoting a healthy lifestyle is paramount to maintaining good health during this developmental phase (Negbal, 2019).

Visually impaired adolescent girls (VIAGs) face challenges in accessing RH information, including basic information about their physical development and changes (**Bowman-Smart, Gyngell, Morgan & Savulescu, 2019**). They often struggle to find independence and feel autonomous, which could lead to higher self-esteem and a better sense of identity (**Mahmoud & Sabbour, 2021**). Disabled adolescents often have limited access to reproductive health information, resulting in overlooked sexuality and rights. This lack of information stems from uncertainties among parents, schools, and counselors, contributing to a deficiency in vital knowledge about their bodies' growth and changes (**Elgiar, Kassem, El-Rahman & Saleh, 2022**).

Visually impaired students face learning challenges and may have low confidence due to their inability to observe and imitate others. Audiobooks serve as an accessible tool for these students, improving their health education and motivation by providing information at their convenience (**Matousek et al., 2020**). Visual impairment and blindness emphasize health and socioeconomic challenges, especially in developing countries. So, their needs should be prioritized through a reproductive health counseling program (**Aval, Rabieepoor, Avval, & Atefeh, 2019**).

Braille remains the key method for blind individuals to independently access information and education. As a vital tool for reading and writing, Braille allows them to explore and comprehend the world through touch. The system was developed to assist visually impaired individuals to overcome limitations and gain knowledge for effective world engagement (**Wang & Takeda, 2022**).

Blind or visually impaired students typically learn slower to read and write than sighted students, but they also need to learn through other senses like touch, smell, listening, and feeling. Health education can benefit from using audiobooks as educational resources for blind students, as they can access them anytime and anywhere, increasing motivation (**Matousek et al., 2020**).

The community health nurse (CHN) and the obstetric nurse should be significantly contribute to the well-being of visually

impaired adolescent girls by fostering independence and enhancing the overall healthy lifestyle dimensions (**Nies & Mcewen, 2020**). The role of CHN is essentially endless, starting by the primary prevention through health education sessions, which is the main step to reach the goal of promoting public health as a whole and reducing of disabilities (**Pullis & Nies, 2019**). CHN could advocate for VIAGs and improve their health through assessing, planning, and organizing an educational program focusing on the targeted areas of puberty, nutrition, reproductive health, physical activity, and overcoming barriers to reproductive health (**Mahmoud & Ibrahim, 2020**).

### Significance of the Study

Egypt faces a high incidence of disabilities; The most prevalent types of disability recorded were visual and physical impairments, which significantly reduce quality of life unless access is provided to high-quality care services that are inclusive of people with disabilities (**unicef Egypt , 2021**). **The World Health Organization (2019)** reported that over 2.2 million people had visual impairments, including 1.4 million children under 19 years old with irreversible blindness. Identifying factors to enhance their adaptation and reduce disability are a crucial issue for improving their overall well-being (**Kington et al., 2021**).

Reproductive health requirements among women with disabilities are often ignored, often due to the assumption that they are not sexually active (**Ganle, Baatiema, Quansah, & Danso-Appiah, 2020**). Healthcare providers should ensure equal support for disabled individuals, though communication barriers with parents which could pose challenges. Reproductive health as a human right encompasses accessible sexual health services for all, including adolescents, fostering self-care, and preventing abuse and violence (**Beninger, 2021**).

**Hassanein, Adawi, & Johnson, (2021)** highlighted the need for enhanced accessibility and inclusiveness of students with disabilities in Egyptian educational settings. Despite the importance of fostering inclusion and equity in educational programs which are supported by the recent research in Egypt, while previous

research in Egypt had not covered all aspects of reproductive health.

Therefore, the current study intends to evaluate the effect of educational program utilizing audio and braille text on knowledge and practice of visually impaired adolescent girls regarding reproductive health in Egypt as a significant group that needs better attention. By addressing the unique needs of this population, the study contributes to Egypt's efforts to achieve the United Nations' Sustainable Development Goals 2030, particularly those related to health, education, and gender equality. The importance of this study lies in its potential to enhance reproductive health education for visually impaired adolescent girls to improve their understanding of reproductive health, promote self-care, and empower them to make informed decisions about their well-being.

### **Aim of the Study**

This study aimed to evaluate the effect of educational program utilizing audio and braille text on knowledge and practice of visually impaired adolescent girls regarding reproductive health.

### **Research hypothesis**

To achieve the study's goal, the researchers developed the following hypotheses:

H1: Visually impaired adolescent girls who receive reproductive health education utilizing audio and a braille text get higher score in post-test practice than in pre-test.

H2: Visually impaired adolescent girls who receive reproductive health education utilizing audio and a braille text get higher score in practice post-test than in pre-test.

### **Subjects and Methods**

#### **Research Design**

A quasi-experimental design (one group pre-posttest) was utilized to achieve the aim of the current study. One-group (pre/post-test) design is a sort of quasi-experimental design in which the result of interest is measured twice: once before and once after exposing a non-

random group of participants to a particular intervention or therapy (Reichardt, 2019).

#### **Setting:**

The study took place at Al Nour Wal Amal Preparatory and Secondary School for blind Girls, located in the Al Nour Wal Amal Association (ANWA) for blind females in Masr Algadida (Heliopolis), Cairo, Egypt. This school is affiliated to the Ministries of Education and Social Solidarity, and it is the only public school for girls among the five mixed schools for the visually impaired in the Cairo Governorate. This school has 6 classrooms: two for primary education, two for preparatory education, and two for secondary education.

#### **Sample:**

A purposive sample was utilized in this study. The school has 55 students in the preparatory stage and 45 students in the secondary stage. The sample size was 90 visually impaired adolescent girls who fulfilled the inclusion criteria.

#### **Inclusion criteria:**

- Visually impaired adolescent girls ranged in age from 11-18 years.
- Ready to participate in the study and follow the instructions.

#### **Exclusion criteria:**

- Visually impaired adolescent girls who have communication or hearing problems.
- Visually impaired adolescent girls who refused to participate in the study or follow instructions.
- Visually impaired adolescent girls under the age of 11 years

**Tools of data collection:** three tools were used to collect data.

**Tool I:** Visually Impaired Adolescent Girls Structured interview questionnaire.

It included the demographics and general characteristics of the visually impaired adolescent girls. It was developed by the researcher and covers 9 closed-ended questions

that include age, school stage, residence, and parents' education and occupation, etc.

**Tool II:** Visually impaired adolescent girls' knowledge assessment questionnaire.

It related to reproductive health (pre/post/follow-up test). It was developed by the researchers to assess visually impaired adolescent girls' knowledge regarding reproductive health. It included 42 multiple-choice questions in four sections:

**Section 1:** Visually impaired adolescent girls' knowledge related to puberty: it consists of 7 questions, such as the definition of puberty, the normal age of puberty for girls, puberty's changes, etc.

**Section 2:** Visually impaired adolescent girls' knowledge related to menstruation: it consists of 7 questions, such as the definition of menstruation, source of menstrual blood, age of menarche, etc.

**Section 3:** Visually impaired adolescent girls' knowledge related to nutrition: it consists of 18 questions, such as food benefits, the balanced diet, the main nutrient elements, nutrient functions, etc.

**Section 4:** Visually impaired adolescent girls' knowledge related to exercise: it consists of 10 questions, such as the importance of exercise and types of exercise, etc.

### Scoring system

The complete correct answer was given two scores (42 questions equaled 84 scores), the incomplete correct answer was given one score, the incorrect, or I don't know, answer was given zero, and the missing data was given zero. The total knowledge score is 84, categorized as a score of  $< 50\%$  ( $<42$ ), indicating an unsatisfactory level of knowledge, and a score of  $\geq 50\%$  ( $\geq42$ ), indicating a satisfactory level of knowledge (Greasley, 2007). The percent of the total score for each item and for total knowledge was calculated using the following equation:

- Summation of score achieved by each girl x 100.

Maximum possible score for each girl. Total knowledge scores converted into a percent score and classified as follows:

- Unsatisfactory level of knowledge =  $<50\%$  of total score.

- Satisfactory knowledge =  $\geq 50\%$  of total knowledge.

**Tool III:** Visually impaired adolescent girls' reported practices related to reproductive health (Pre /Post/Follow up Test), it included 35 multiple choice questions in 3 sections:

**Section 1:** Visually impaired adolescent girls' reported practices related to menstrual hygiene: it consists of 13 questions, such as type of towel used during menstruation and frequency of changing it, frequency of bathing during the menstrual cycle, cleaning the perineal area, and methods of cleaning, etc.

**Section 2:** Visually impaired adolescent girls' reported practices related to nutrition: it consists of 13 questions, such as number of daily meals and snacks, taking breakfast, etc.

**Section 3:** Visually impaired adolescent girls' reported practices related to exercises: it consists of 8 questions, such as doing exercise, kind of exercise, etc.

### Scoring system

Each appropriate practice got two scores (35 questions equal 70 scores), each inappropriate practice got one score, and missing data or unimplemented practice get zero. The reported practice scores calculated by adding the scores for the appropriate practice. The total number of points would be 70, considered as score  $\geq 50\%$  ( $\geq 35$ ) referring to the appropriate practice and score  $< 50\%$  ( $< 35$ ) referring to the inappropriate practice.

### Description of the program:

The content of the reproductive health program was developed by the researchers in Arabic, and the program content has been revised and translated from the Arabic text into a text in Braille. In the library of ANWA, the researchers and expert professors who are members of ANWA evaluated the content after translating it into the Braille method to ensure the Arabic program content matches the content of the Braille method. Interventions were developed based on communication and

counselling skills, genital models, and various types of pads to engage the auditory and tactile senses of the participating girls in the learning process.

The program was presented, and the content was explained face-to-face to adolescent girls with visual impairments using appropriate educational aids for them, such as models and practical applications. Also, an audio booklet about the reproductive health was designed in addition to recording the audio (oral) explanation in each session of the program that was presented to the students in the classes, burned onto a CD, and handed over to each student. The content of the program is consistent with the scientific references provided by the researchers, which are the subject of the audio and braille booklet entitled "Reproductive Health for Visually Impaired Adolescent Girls".

#### **The program included (4) four phases; these phases were classified into:**

- 1-Assesment session (introductory session, pretest, and explanation of the program aim)
- 2- Implementation sessions. It included 4 sessions.
- 3- One immediate post- test session.
- 4- After one month one follow-up session.

#### **Validity and Reliability**

Three experts from the community health nursing department at Cairo University were asked to check the I and II tools for their validity. Modifications of the content were made according to the panel's judgement on the clarity of sentences and appropriateness of the content. The reliability of the knowledge tool was tested using Cronbach's alpha (0.89). Also, the reliability of the reported practices tool was tested by using Cronbach's Alpha equal to 0.800.

#### **Pilot study**

Based on the total sample size, nine visually impaired adolescent girls (10%) who met the criteria for inclusion were chosen for the pilot study. The purpose of the pilot study was to evaluate the tool questions' clarity and the amount of time required to respond to each one. Moreover, to identify any difficulties that may emerge and need to be handled before applying the study. All VIAGs who participated in the

pilot study were included in the research sample.

#### **Ethical considerations**

The primary official permission for the study was obtained from the Research Ethics Committee at the Faculty of Nursing, Cairo University, to approve the study tools and procedures. Each female student was made aware of the significance and goal of the study. The researcher emphasized that participation was voluntary, and students could withdraw at any time without providing a reason or affecting the care they would receive. Participants were reassured that their identities would be kept anonymous, and their information securely stored for research purposes only. Parents of research participants who met the inclusion criteria and were willing to participate provided informed written consent. Additionally, the female students themselves gave their oral agreement to take part in the study.

#### **Procedure**

Prior to data collection, the researchers conducted a thorough review of latest literature to develop and prepare the necessary data collection tools. These tools were subsequently reviewed by experts in Maternity and Community Health Nursing. Upon receiving the study approval letter from the Research Ethics Committee of the Faculty of Nursing at Cairo University, official permission to conduct the proposed study was obtained from the Central Agency for Public Mobilization and Statistics (CAPMAS), the Ministry of Education, the Cairo Educational Directorate, and Al-Nozha Educational Zone.

Additionally, oral permission was secured from the director of Al Nour Wal Amal Schools (preparatory and secondary) for blind girls. After obtaining written consent from the female students' parents who agreed to participate, the researchers-initiated data collection. between October 2022 and January 2023. The study was conducted in four phases: assessment, planning, implementation, and evaluation as the following.

### 1- Assessment phase:

This phase involved providing an introductory explanation about the study's aim, followed by administering a pretest to the participating girls by the researchers. The researchers visited the school to introduce themselves to the female students who met the eligibility criteria. Each student was interviewed individually in a quiet environment in the visitors' area which affiliated to the blind association. They were informed orally about the purpose and scope of the study, after which the researcher collected demographic data using a structured interview questionnaire.

Additionally, each female student's knowledge and reported practices regarding reproductive health were assessed using a visually impaired female adolescents' structured interview questionnaire and their reported practices questionnaire. The time required to complete the questionnaires ranged between 30 and 45 minutes. This phase lasted one month, as the researchers conducting field visits three days per week for five hours each day (from 9 a.m. to 2 p.m.).

### 2- Planning and designing phase:

Based on the assessment results and an extensive review of pertinent literature, the researchers developed a health education program focused on reproductive health for visually impaired adolescent girls based on their identified needs during the assessment phase then reviewed by experts in maternity and community health nursing. Initially designed in English, the program was translated into Arabic. Subsequently, the researchers collaborated with Braille professionals in the library of ANWA to convert the program content from Arabic to Braille. Then the specialists reviewed the program again and verified that the content in Arabic was fully compatible with the content of the program in Braille text.

### 3- Implementation phase:

Following the planning phase, the implementation phase took place. Sessions were conducted using effective communication methods. The reproductive health education program, designed for visually impaired adolescent girls, consisted of four sessions,

with each session structured as a teaching class. At the beginning of each session, an orientation regarding the session's objective was provided.

The total number of participating adolescents was divided into eight small groups based on their school years, with each group comprising eight to ten adolescents. The program was delivered to each group consistently by the researcher, and each group attended four sessions. The duration of each session ranged from 30 to 45 minutes, each session featuring a 30-minute lecture and an additional 15-minute open discussion to clarify and address any misunderstandings. Braille text booklets, audio film CDs, and counseling sessions were utilized. This phase was completed within one month.

### The program sessions:

1. Introductory session: This session aimed to clarify the purpose of the program and inform the girls about the study's phases and program sessions (time, duration, location, rules, and contents). Teaching aids such as genital models, various types of pads, and a model of the female reproductive system were used, along with teaching methods like lectures, discussions, and counseling. The researchers emphasized the importance of consistent attendance and active participation. The sessions were conducted in the educational hall within the school.
2. First session: This session focused on imparting knowledge about puberty, including the definition, female genital organs, and the physical, psychological, and social changes associated with puberty.
3. Second session: This session consisted of both knowledge and practice components. The knowledge portion covered the meaning, physiology, symptoms of the menstrual cycle, and characteristics of vaginal secretions. The practical segment addressed personal hygiene and self-care during menstruation.
4. Third session: This session also included knowledge and practice elements. The knowledge part explored the concept of healthy nutrition, the food pyramid, the six food groups, types of nutrients, and essential

tips for healthy eating. The practical portion discussed selecting appropriate foods, beverages, and herbs to consume during menstruation, as well as foods to avoid.

5. Fourth session: This session comprised knowledge and practice components as well. The knowledge segment covered the importance, types, and timing of exercise. The practical part focused on warm-up exercise techniques.

#### 4- Evaluation phase:

In the evaluation phase, the researcher reassessed the same group of visually impaired adolescent girls' knowledge and practice regarding reproductive health using the same tools, both immediately after intervention and one month after implementing the program. This was done to evaluate the retention of acquired knowledge and any changes in their practices resulting from the program.

#### Statistical Analysis

Upon completing data collection, the data was organized and evaluated using the SPSS (Statistical Package for the Social Sciences) software, version 27. Both descriptive and inferential statistical methods were employed, including computation of mean, standard deviation, frequency, and percentage. We also utilized statistical tests such as the chi-square test, independent t-test, Mann Whitney test, and Friedman's test. The Spearman's rho coefficient was applied to establish the relationship's direction and magnitude between certain variables. A p-value threshold of 0.05 was set to ascertain the significance of the results, with a p-value above 0.05 implying non-significant results and below 0.05 signifying significant results. The influence of specific independent variables on the participants' knowledge and practices was assessed using the ANOVA test during the pretest, posttest, and follow-up tests.

#### Results

Table (1) revealed that, 60% of girls aged between 15 and 18 years old with  $\bar{x} \pm SD$  of girls age was  $14.8 \pm 1.4$ . While 61.1% of girls were enrolled in preparatory schools. Also 92.2% of girls lived in urban areas. Concerning number of family members, 53.3% of girls had

three to less than five members. The table also showed that, 71.1% of girls reported that they had insufficient family's income per month. Regarding parent's education and occupation, 58.8% and 51.1% of father and mothers had a university education, respectively, while 41.1% and 31.1% of mother and fathers had a secondary education respectively. Also 72.2% of fathers were employees, while 77.8% of mothers were housewives.

Table (2) indicated that there was a statistically significant relation between girls' mean total scores of knowledge about puberty, menstruation, nutrition, exercise, in girls' mean scores of all knowledge dimensions and total knowledge in pretest, immediate posttest and follow up with ( $p=0.0001$ , ( $p=0.0001$ ), ( $p=0.0001$ ), ( $p=0.0001$ ), ( $p=0.0001$ ), ( $p=0.0001$ ) respectively.

Table (3) showed that there was a statistically significant relation between girls' mean scores of menstruation practices, nutrition practices, exercise practices, all practice dimensions and total practice in pretest, immediate posttest and follow up with ( $p=0.0001$ ), ( $p=0.0001$ ), ( $p=0.0001$ ), and ( $p=0.0001$ ) respectively.

Table (4) and Figure (3) indicated that 41.1% of girls had satisfactory knowledge in the pretest compared to 100% and 96.7% in the immediate posttest and follow-up respectively. There was a statistically significant relation between levels of knowledge in pretest, immediate posttest and follow up with  $X^2=13.1$ ,  $p=0.0001$ . This figure supported the first research hypothesis.

Table (5) & Figure (4) indicated that 31.1% of girls had appropriate practice in the pretest compared to 94.4 and 100% in the immediate posttest and follow-up respectively. There was a statistically significant relation between levels of practice in pretest, immediate posttest and follow up with  $X^2=1.61$ ,  $p=0.0001$ .

Table (6) showed a statistically significant positive correlation between girls' knowledge about puberty and their practices during menstruation, nutrition, exercise, and total practice dimensions with ( $p = 0.0001$ ). In addition, a significant positive correlation between girls' knowledge about menstruation

and their practices during menstruation, nutrition, exercise, and total practice dimensions with ( $p = 0.0001$ ). Regarding girls' knowledge about nutrition, there's a statistically significant positive correlation between girls' nutrition knowledge and their practices during menstruation, exercise, and overall practice dimensions with ( $p=0.0001$ ). A statistically significant positive correlation was

detected between girls' knowledge about exercises and their practices during menstruation, nutrition, and total practice dimensions with ( $p = 0.0001$ ). A highly significant positive correlation between girls' total knowledge of all dimensions and their practices during menstruation, nutrition, exercise, and total practice with ( $p = 0.0001$ ).

**Table (1): Percentage distribution of visually impaired adolescent girls according to their demographic characteristics (n = 90).**

Variables	No. N=90	%
<b>Educational stage</b>		
Preparatory stage	55	61.1
Secondary stage	35	38.9
<b>Age</b>		
12<15	36	40.0
15-18	54	60.0
<b>Mean ± SD</b>	<b>14.8 ± 1.4</b>	
<b>Residence</b>		
Rural	7	7.8
Urban	83	92.2
<b>Number of family members</b>		
3<5	48	53.3
5-7	42	46.7
<b>Monthly income</b>		
Insufficient	64	71.1
Sufficient	26	28.9
<b>Father education</b>		
Basic education	2	2.2
Read and write	7	7.8
Secondary education	28	31.1
University education	53	58.9
<b>Mother education</b>		
Basic education	6	6.7
Secondary education	37	41.1
University education	46	51.1
Postgraduate	1	1.1
<b>Father occupation</b>		
Craftwork	5	5.6
Employee	65	72.2
Retired	11	12.2
Others	9	10
<b>Mother occupation</b>		
Employee	20	22.2
Housewife	70	77.8



**Table (2): Mean scores of girls' reproductive health knowledge dimensions pre, post, and follow-up tests (n = 90)**

Knowledge	Pre		Post		Follow up		ANOVA	
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	F	P
Girls' knowledge about puberty	5.60	1.56	12.51	1.17	12.81	1.06	909.147	.0001*
Girls' knowledge about menstruation	5.61	2.13	13.33	0.96	11.57	0.81	723.807	.0001*
Girls' knowledge about nutrition	20.50	3.74	32.96	1.46	38.19	1.57	120.0	.0001*
Girls' knowledge about exercises	9.43	2.37	16.60	1.65	17.24	1.10	529.991	.0001*
<b>Total knowledge</b>	<b>41.14</b>	<b>5.50</b>	<b>75.40</b>	<b>2.88</b>	<b>79.81</b>	<b>2.24</b>	<b>277.1</b>	<b>.0001*</b>

\*Significant at p-value<0.05

**Table (3): Mean scores of girls' reproductive health practice dimensions pre, post, and follow-up tests (n = 90)**

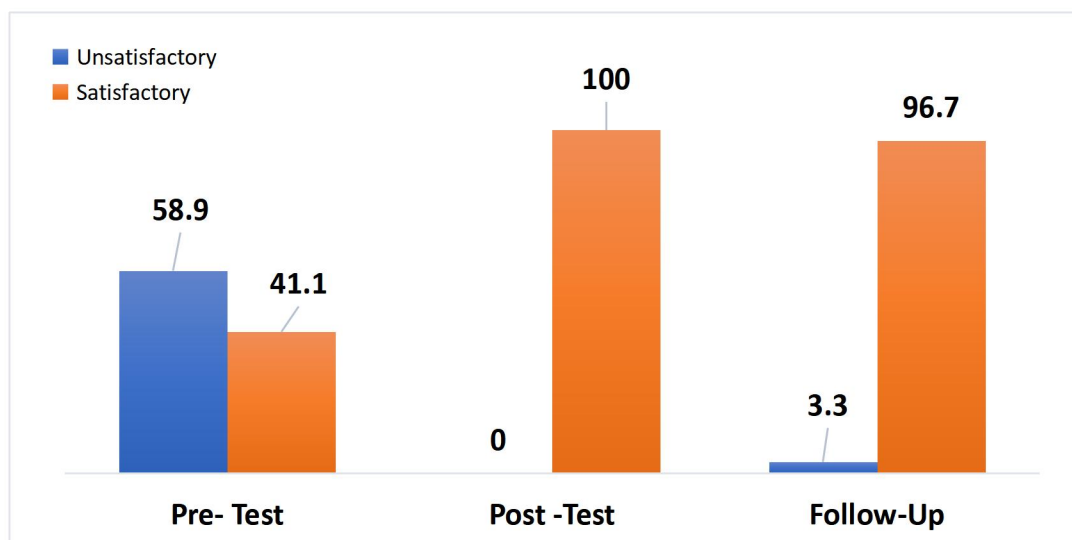
Practice regarding reproductive health	Pre		Post		Follow up		ANOVA	
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	F	P
Girls' practice during menstruation	16.30	2.24	24.02	1.52	24.63	1.34	640.255	.0001*
Girls' practice regarding nutrition	11.22	3.58	23.87	3.94	25.72	2.63	476.789	.0001*
Girls' practice regarding exercise	1.40	1.83	3.93	2.50	4.82	2.47	54.187	.0001*
<b>Total practice</b>	<b>28.92</b>	<b>6.11</b>	<b>51.82</b>	<b>4.98</b>	<b>55.18</b>	<b>3.96</b>	<b>708.299</b>	<b>.0001*</b>

\*Significant at p-value<0.05

**Table (4): Percentage distribution of girls according to their total knowledge level regarding reproductive health pre, post, and follow-up tests (n = 90)**

Knowledge level	Pre		Post		Follow up		X2	p
	No.	%	No.	%	No.	%		
Unsatisfactory	53	58.9	0	0.0	3	3.3	13.1	0.0001*
Satisfactory	37	41.1	90	100.0	87	96.7		

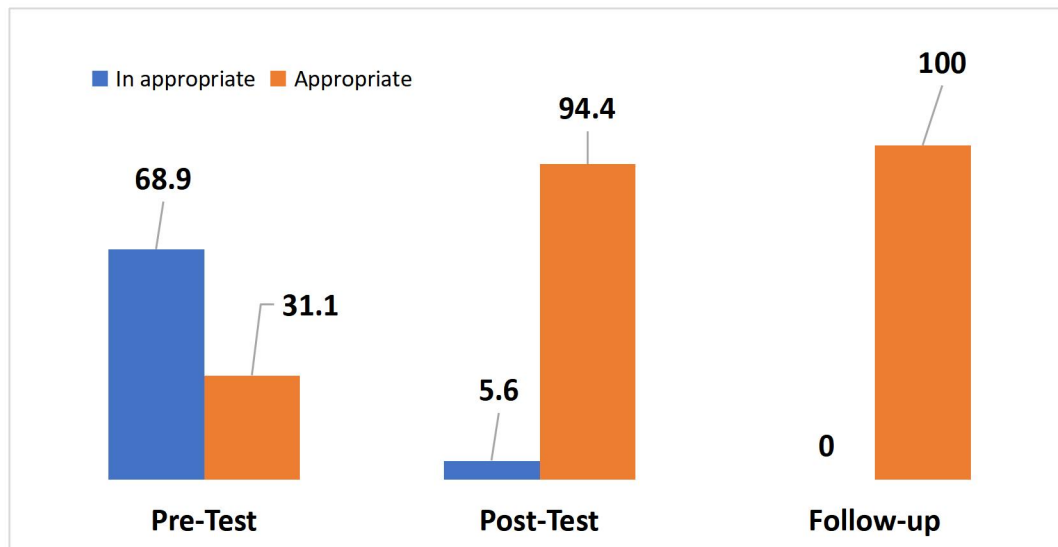
\*Significant at p-value<0.05

**Figure (3): Percentage distribution of girls' total knowledge levels pre, post and follow-up-tests (No. =90).**

**Table (5): Percentage distribution of girls according to their total practice level regarding reproductive health pre, post, and follow-up tests (n = 90)**

Practice level	Pre		Post		Follow up		X2	P
	No.	%	No.	%	No.	%		
Inappropriate	62	68.9	5	5.6	0	0.0	1.61	0.0001*
Appropriate	28	31.1	85	94.4	90	100		

\*Significant at p-value<0.05



**Figure (4): Percentage distribution of girls' total practice levels pr, post and follow-up tests (No. =90).**

**Table (6): Correlation between girls' knowledge and practices dimensions regarding reproductive health pre, post, and follow-up tests (n = 90)**

Knowledge	Practices							
	Girls' practices during menstruation		Girls' practices regarding nutrition		Girls' practice regarding exercise		Total practice	
	R	P	r	P	r	P	r	P
Girls' knowledge about puberty	0.87	0.0001*	0.83	0.0001*	0.56	0.0001*	0.85	0.0001*
Girls' knowledge about menstruation	0.76	0.0001*	0.72	0.0001*	0.42	0.0001*	0.75	0.0001*
Girls' knowledge about nutrition	0.84	0.0001*	0.81	0.0001*	0.47	0.0001*	0.84	0.0001*
Girls' knowledge about exercises	0.87	0.0001*	0.81	0.0001*	0.50	0.0001*	0.86	0.0001*
Total knowledge	0.89	0.0001*	0.85	0.0001*	0.52	0.0001*	0.89	0.0001*

\*Significant at p-value<0.05

**Discussion:**

Reproductive health is a crucial aspect for young individuals to develop healthily. A growing amount of research shows that RH education from respectable, trustworthy sources can influence young individuals to make responsible decisions and engage in positive

sexual behaviors (Leekuan, Kane, Sukwong, & Kulnitichai, 2022). The promotion of RH through education is still a touchy and divisive subject despite its widely acknowledged necessity. In several countries and cultural situations, providing adolescent females with trustworthy, dependable sources of RH education might be difficult (Smith & Sinkford, 2022).

The present study was carried out to evaluate the effect of educational program utilizing audio and braille text on knowledge and practice of visually impaired adolescent girls regarding reproductive health.

Results of the present study showed that more than half of the participating girls were aged between 15 and 18 years, with a mean age of  $14.8 \pm 1.4$  years. Similar findings were reported in a study done by **Abd-Elmegaly, Attia & Soliman (2019)**, who assessed the effect of an audio teaching program on RH knowledge and attitude among 60 blind girls in Cairo, El-Fayoum, and Banisuef city. Of the 60 girls, 56.7% were between the ages of 15 and 18. These results were also supported in a study done by **Kumbhar & Bhore (2021)**, who studied the effect of a self-instructional module vs. audio CD-ROM about reproductive health knowledge and self-reported practices among 12 blind adolescent students in selected blind schools in India. They found that 75% of the adolescents were aged between 15 and 18 years old. This age range corresponds to the middle and late stages of adolescence and is associated with greater health risk behaviors, making this group particularly vulnerable.

Regarding the monthly income of the family, the results of the current study indicated that, more than two thirds of adolescent's girls reported that they had insufficient income. This result supported in a study done by **El-Kurdy, Fadel & Elsayed (2020)** who studied the effect of structured audio educational sessions on visually challenges adolescent school-girls' knowledge and practices regarding menstruation, among fifty-three visually challenges adolescent school-girls at Mansoura, Egypt, they reported that 64.2% of adolescent girls reported that they had insufficient family income. According to the researchers, this outcome was expected because two-thirds of the fathers of the adolescent girls are employees, and nearly half of them live in large families, so the income is not enough to meet their many requirements.

About the parent's educational level, the results of the current study showed that more than half of adolescents' girl's parents had university education. This result was contrary with the results of a study done by **Bahari, Shokravi, Anosheh & Moridi (2021)** who studied the impact of education program on 100 visually

impaired adolescent girls regarding knowledge of puberty in Iran, it revealed that 15% of adolescent girls mother had university education and 26% of adolescent girls father had university education.

In addition, the results of the current study revealed that more than two thirds of adolescent girls' mothers were housewives. This result matched with the results of the study conducted by **Mustafa & Muhammad (2018)** who studies impact of educational program on reproductive health knowledge of female preparatory school students in Alexandria Governorate, Egypt. The study was conducted on 102 preparatory school female students, they found that 64.7% of adolescent girl's mothers were housewives. This result also was supported in a study done by **Arunachalam, Shetty & Rajendran (2022)** who studies awareness and practice of menstrual hygiene among 30 visually impaired adolescent girls: using braille methods in India and found that 86.67% of adolescent girls' mothers were housewives.

From the researcher's point of view, mothers especially Egyptian mothers are the primary caregivers in their families as they most of the time at home plus they carry most of the responsibilities, also most of the mother believes that they are the only person who could take care, protect and meet her child's needs, while fathers do not had the time to provide care for the children as they spend most of the time working outside the home.

The present study revealed that, the majority of the adolescent girls had satisfactory level of knowledge in immediate posttest and follow up compared to fewest percentages of them in the pretest. A statistically significant difference was found between adolescents' total knowledge scores regarding all aspects of reproductive health (puberty, menstruation, nutrition, and exercise) in pre, immediate posttest, and follow up with ( $f=277.1, p=0.0001$ ).

These results agreed with a study **done by Kumbhar & Bhore, (2021)** who found that, 91.67% and 75% of blind adolescent girls had poor knowledge regarding reproductive health among SIM group and Audio-CD ROM group during the pretest respectively. While 41.67% and 50% of them had average knowledge among SIM group and Audio- CD ROM during the posttest respectively, it also reveals a that there was

a significant difference between the mean score of pre-test knowledge with ( $f=9.1666$ ) and mean score of post-test knowledge with ( $f=14.00$ ) among SIM group with ( $p=.000$ ). Also, there was a significant difference relation between the mean score of knowledge at the pre-test with ( $f=9.30$ ) and mean score of knowledge posttest with ( $f=13.10$ ) of Audio-CD ROM group with ( $p=.000$ ).

These findings were also matched with the findings of a study conducted by **Mahmoud & Ibrahim (2020)** to evaluate the effectiveness of educational sessions on reproductive health among 63 blind and deaf students at Zagazig city and found that, 100% of the blind and deaf students had poor knowledge regarding reproductive health in pretest while 90.5% and 88.9% of them had good knowledge regarding reproductive health in immediate posttest and follow-up respectively. It also reveals that there was statistically significant difference between the mean score of pre-test knowledge, mean score of post-test knowledge and mean scores of follow up knowledge with ( $f=850.3$ ,  $p=0.001$ ).

The current study showed that total knowledge  $\bar{x}\pm SD=41.14\pm 5.50$  in the pretest, increased to be  $\bar{x}\pm SD=75.40\pm 2.88$  and  $\bar{x}\pm SD=79.81\pm 2.24$  in the immediate posttest and follow up respectively with a statistically significant difference among girls' mean scores of total knowledge in pretest, immediate posttest and follow up with ( $f=277.1$ ,  $p=0.0001$ ). These results were supported by the results of a study done by **Ali & Abd-El Aal (2015)** who evaluated the effect of health educational program among 71 females blinded adolescents students regarding RH at Cairo governorate, they reported that total knowledge with  $\bar{x}\pm SD=10.67\pm 4.55$  in the pretest, increased to be  $\bar{x}\pm SD=14.30\pm 2.62$  in the posttest, with a statistically significant difference among females adolescents with mean scores of the total knowledge during the pretest and immediate posttest with  $t=9.33$ ,  $p<0.001$ .

From the researchers' point of view, it may be related to the availability of individual book about reproductive health which was available for each adolescent girl in the library of the school, and it was translated to the Braille method, which helps adolescents' girls to read it at any time and gain knowledge which they used in practices. It may also be due to method of

knowledge used which related to demonstration, re-demonstration, and role play.

Findings of the present study revealed that, the majority of adolescents girls had appropriate practice in immediate posttest and follow up compared to fewest percentages of them during the pretest with a statistically significant difference between adolescents' total practice scores regarding all aspects of reproductive health (puberty, menstruation, nutrition, and exercise) in pre, immediate posttest, and follow up.

These results agree with the finding of a study done by **Kumbhar & Bhore, (2021)** who found that, 83.33% and 100% of blind adolescent girls had poor practice regarding reproductive health in SIM group and Audio-CD ROM group during the pretest respectively, while of 50% and 33.33% of them had average practice among SIM group and Audio-CD ROM group during the posttest respectively, it also reveals that there was significant difference between the mean score of practice pre-test with ( $f=260.5$ ) and mean score of practice post-test with ( $f=38.75$ ,  $p=.000$ ) of SIM group. Also, there was significant difference between the mean score of practice pre-test with ( $f=13.46$ ) and mean score of practice post-test with ( $f=30.99$  and  $p=.000$ ) of the Audio-CD ROM group.

The current study indicated that the total practice  $\bar{x}\pm SD=28.92\pm 6.11$  in the pretest, increased to be  $\bar{x}\pm SD=51.82\pm 4.98$  during the immediate posttest and  $\bar{x}\pm SD=55.18\pm 3.96$  in the follow up with a statistically significant difference among girls' mean scores of total practice during the pretest, immediate posttest and follow up with  $f=708.299$ ,  $p=0.0001$  (Table 3). These results were supported by the results of a study done by **Ali & Abd-El Aal (2015)** who reported that total practice  $\bar{x}\pm SD=38.76\pm 8.95$  in the pretest, increased to be  $\bar{x}\pm SD=54.42\pm 9.48$  during the immediate posttest. There was a statistically significant difference among adolescent girls mean of total practice in pretest and immediate posttest with  $t=15.30$ ,  $p<0.001$ .

From the researchers' point of view, when knowledge improves, practice tends to be healthier. If adolescent girls had satisfactory knowledge about their body changes, menstrual hygiene management, proper nutrition, and adequate exercises they had the opportunity to easily practice all issues which related to the

reproductive health which positively affected their general condition.

The present study revealed that a statistically significant positive correlation between adolescent girls' total knowledge scores and total practice scores with ( $r= 0.89$ ,  $p=0.0001$ ) (Table 4). This result agree with a study done by **Ali & Abd-El Aal (2015)** who found that, a statistically significant positive correlation between total knowledge scores and total practice scores pre and post implementation the program with ( $p<0.001$ ). Also this result supported with the results of a study conducted by **Kumbhar & Bhole, (2021)** who reported that there was significant correlation between the total knowledge scores and total practice score in the pretest and immediate posttest with  $p<0.001$ .

From the researchers' point of view the effectiveness of the reproductive health education program, which contained relevant information utilizing audio and braille text which enabled blind adolescents' girls to understand all components of reproductive health, so when their knowledge has improved, their practices become healthier too.

### **Conclusion:**

The findings of the current study highlight that the use of audio and Braille text significantly improved adolescents' knowledge and practice concerning reproductive health, thereby confirming the research's hypotheses. In addition, there was a statistical relation between levels of knowledge in pretest, immediate posttest and follow up with  $X^2=13.1$ ,  $p=0.0001$ . Also, there was a statistically significant relation between levels of practice in pretest, immediate posttest and follow up with  $X^2=1.61$ ,  $p=0.0001$  regarding reproductive health among studied visually impaired adolescent girl students.

### **Recommendations:**

Based on the study results, the following recommendations are proposed:

- Expand the educational program through offering continuous health education programs to increase VIAGs' awareness about reproductive health in a different environment.
- Incorporate the reproductive health issue into the regular curriculum to ensure the

effectiveness and long-term impact of the program.

- Publication and disseminat of an educational braille booklet and a recorded CD for adolescent girls with visual impairments through the Ministry of Health and Population and the Ministry of Education in all schools for the blind to disseminate the culture of reproductive health among girls who will be the future mothers.
- Involving regular media, such as radio and television, in reproductive health education by professionals is very beneficial for obtaining health information.
- Training for educators and facilitators to ensure that they are well-equipped to address the unique needs of visually impaired adolescents.
- Replication of this study on a large scale and in all schools for VIAGs at the national level to generalize the results.
- Further research could explore more about the specific aspects of reproductive health that students find challenging, and how these could be better addressed using audio and Braille materials.

### **Ethics Approval and Consent to Participate**

This research was approved by the Human Research Ethics Committee-Faculty of Nursing-Cairo University.

- Study number (2023-09).
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