

Effect of using assistive technology on healthy lifestyle of visually impaired students

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Abstract

Background: Assistive Technology (AT) can significantly contribute to improving various aspects of visually impaired students' lives. **Aim:** The aim of this study was to assess the effect of using assistive technology on healthy lifestyle among visually impaired students. **Design:** A quasi-experimental design with a one group pre/post-test was utilized. **Setting:** The study was conducted at El-Noor School for visually impaired students in Cairo governorate affiliated with the Ministry of Social Solidarity in Cairo governorate. **Sample:** A multi-stage cluster sample of 50 students was included. **Data collection tool:** Three tools were used for data collection: **Tool (I)** student's personal data questionnaire, **Tool (II)** healthy lifestyle knowledge questionnaire, and **Tool (III)** Healthy lifestyle practices scale. **Results:** There was a highly statistically significant difference between pre and post-total knowledge and practice scores of visually impaired students regarding healthy lifestyle, with $P < 0.001$. **Conclusions:** The educational program incorporating AT had a significant positive effect on students' total knowledge and practice scores, as demonstrated by increased total mean scores in post-tests compared to pretest mean scores. **Recommendations:** Implement health education initiatives to enhance the knowledge and understanding of healthy lifestyle practices among teachers and school administrators in visually impaired schools and conduct a follow-up assessment to validate the long-term effect of using AT on improving the healthy lifestyle of students with visual disabilities.

Keywords: Assistive technology, Healthy Lifestyle, Knowledge, Practices & Visually impaired students.

Introduction

Assistive technology (AT) is crucial in educational programs designed for children with visual impairments (VI). These children can improve their abilities by utilizing AT, actively participating in class, promoting self-reliance, and advocating for healthy lifestyle choices (Bin Tuwaym & Berry, 2018). AT encompasses a range of tools, techniques, and support systems that aim to enhance the independence, well-being, and integration of individuals with visual impairments. Students with VI sometimes face communication difficulties, resulting in their exclusion from social services, healthcare, education, and overall community involvement, including within their families. Therefore, this may have a profound and long-term impact on the future opportunities available to students (Al Shehri et al., 2022).

AT encompasses any commercially obtained, modified, or personalized tool to uphold or enhance an individual's functional abilities (Alshahrani, 2020). AT can be classified into three distinct categories: "low-tech" devices (such as mechanically operated devices like Perkins braille), "high-tech"

devices (including electrical and battery-operated devices), and "no-tech" devices (such as pencil holders and magnifiers). Visually impaired students benefit from a range of assistive technologies, including mobility aids and Braille, haptic devices, information and communication technology, everyday life technology, and smartphone apps (Linda et al, 2018).

Achieving optimal health requires maintaining one's lifestyle and daily routines (Solhi et al., 2020). A healthy lifestyle means keeping up a sound way of life and presenting practices that improve health. Healthy lifestyle includes social, mental, emotional, physical, and spiritual wholeness as well as overall well-being (Dhiman & Chawla, 2017). A healthy lifestyle is closely linked to improved health, suggesting that adopting a healthy lifestyle will contribute to promoting overall well-being (Moghaddam et al., 2017). According to Ahmed (2018), "healthy living" pertains to maintaining a healthy lifestyle and adopting healthy habits.

According to the World Health Organization (2018), approximately 1.3 billion individuals globally experience visual impairments. The population of

individuals in this category with mild vision impairment is around 188.5 million, whereas 217 million have moderate to severe vision impairment, and 36 million are blind. The prevalence of visual impairment is rapidly increasing, highlighting the need for efficient assistance programs. **Alshahrani (2020)** states that most individuals with vision impairments require AT to facilitate their daily activities and access information.

Students with VI frequently face neglect and rank among the most disadvantaged globally. Several countries recognized public health promotion as a crucial technique to prevent and reduce global illness and mortality rates and enhance general community health (**Diclemente et al., 2019**). In order to improve the visually impaired students' quality of life, the community health nurse can assess their needs, assist them in adopting a healthier lifestyle, and educate them on various topics, including diet, exercise, stress management, reproductive health, injury prevention, the dangers of smoking, and substance misuse (**Shenouda et al., 2018**).

Significance of the study

Visual impairment is a major global health condition that impacts individuals worldwide. Approximately 2.2 billion individuals worldwide experience vision impairment, and almost 1 billion cases are avoidable (**WHO, 2021**). According to the World Health Organization's report in 2019, Egypt has a population of about 1 million individuals who are blind and 3 million individuals who have visual impairments. The prevalence of visual impairment in Egypt remains significant (**Abdelazeem, 2022**). According to the United Nations, almost one-third of the global population with disabilities is in their teenage years, and over 80% of them reside in developing nations (**AlSawahli et al., 2020**).

A study conducted by **Abdelazeem (2022)** examined the healthy lifestyle practices of visually impaired adolescent students at El-Noor School in Minia governorate. The study revealed that 81.7% of students with VI exhibit unhealthy lifestyle habits, with an average lifestyle total score of 38.61 ± 5.73 . The findings recommended implementing health education programs that prioritize different facets of lifestyle habits for visually impaired students.

Upon conducting an extensive examination of the available literature, the researchers discovered that although there were occasional studies investigating the impact of AT on visually impaired students' overall well-being. However, the majority of national and international studies focused only on assessing the students' willingness to adopt and utilize such technology.

Consequently, the current study's findings will substantially contribute to the existing body of knowledge in nursing. In addition, the study is beneficial to community health nurses in implementing educational programs. Therefore, this will enhance visually impaired students' understanding and application of healthy lifestyle domains to improve their quality of life and increase their independence in society, achieve optimal health, and avoid adverse health outcomes later in life.

Methods

Aim of the Study:

This study aimed to assess the effect of using assistive technology on healthy lifestyle among visually impaired students.

Research Hypothesis

To achieve the aim of this study, the following research hypotheses were formulated:

H1: The mean scores of post-test healthy lifestyle knowledge of visually impaired students exposed to educational programs utilizing AT will be higher than the pretest mean scores.

H2: The mean scores of post-test healthy lifestyle practice of visually impaired students exposed to educational programs utilizing AT will be higher than the pretest means scores.

Research Design

A quasi-experimental design (one group pre/post-test) was utilized to achieve the study's objectives. A quasi-experimental study utilizes independent variables to examine their impact on dependent variables, using a single group pretest-posttest design, assuming that any alterations in outcomes can be attributed to the educational program (**White & Sabarwal, 2014**).

Operational definitions

In the context of this study, **visual impairment** refers to a reduction in the eye's capacity to see forms and object features at a specific distance. It is categorized based on the level of severity (**Liang et al., 2022**).

Assistive technology: The AT used in the educational program application was the Braille method and Screen readers. Braille displays transform the visual text displayed on a screen into braille characters on a specific output display. Screen readers are software programs that audibly read the text displayed on a screen and provide verbal descriptions of the visual display based on the cursor's position or the user's keyboard input (**Madake et al., 2023**).

Setting

The study was carried out at El-Noor School, a Cairo-based institution for visually impaired children, under the supervision of the Ministry of Social Solidarity. The school serves visually impaired students in kindergarten through secondary school, providing educational, cultural, sports, and recreational

opportunities. It consists of three-storey buildings accommodating both male and female students. A multi-stage cluster sampling technique was utilized to select the study sample. Out of the four social directorate zones in Cairo Governorate, the El-Zatoon directorate was randomly selected. One school, El-Noor school, was chosen at random from this zone. This school is the only one in this educational directorate that caters specifically to visually impaired students. Visually challenged children in this school were randomly selected, ensuring they fulfilled the inclusion criteria.

Sample

The study encompassed a cohort of 50 preparatory and secondary students. El-Noor School includes 75 students (boys & girls) at the preparatory and secondary stages. A multi-stage cluster sampling technique was used to select the study sample. One school was selected randomly from the educational department in the south of Cairo. After the selection of the school, all students at the preparatory and secondary stages who fulfilled the inclusion criteria were included in the study. Furthermore, the approval of students' parents was obtained to ensure their participation. The sample size was calculated using (Epi-info statistical package, version 7.2, designed by the CDC (Centre for Disease Control and Prevention, 2009) with 80 percent power. Preparatory and secondary school students were selected due to the advantageous period of adolescence, which is ideal for implementing educational initiatives that encourage healthy lifestyle choices and prevent potential negative consequences in the future.

Inclusion Criteria

1. Adolescent students aged from 13-20 years.
2. Free from other chronic health problems and devoid of other forms of disabilities.

Tools for Data Collection

After reviewing related national and international literature, data collection tools were developed by the researcher to assess the effect of using AT on the healthy lifestyle of visually impaired students. Data were collected through three tools: student's personal data questionnaire, healthy lifestyle knowledge questionnaire, and healthy lifestyle practices scale.

Tool 1: Student personal data questionnaire.

It consisted of 7 questions about age, sex, grade, parents' educational level, and occupation. This part was used only before the application of the educational program.

Tool 2: Healthy lifestyle knowledge questionnaire.

It was developed by the researcher based on WHO Quality of life questionnaire (2010) to assess visually impaired student's knowledge regarding healthy lifestyle domains. It included 27 questions with three

responses (yes, to some extent, no) and consisted of six parts; nutrition (8) items; physical activity (4) items; health knowledge (activity of daily living) (6) items; stress management (3) items, interpersonal relations (3) items; and spiritual health (3) items. This tool was used as a post-test.

Scoring system for healthy lifestyle knowledge questionnaire

The questions were designed to be answered by (yes= 2, sometimes =1, and no = 0). The overall score ranged from 27 to 54 (total score is 54). The items of the questionnaire (27) were classified and scored as poor lifestyle knowledge with a score of less than 27 ($\leq 50\%$), good lifestyle knowledge with a 40.5- 54 score ($\geq 75\%$), and fair lifestyle knowledge scored from 27- to less than 40.5 (50% to $<75\%$) out of total score 54 points.

Tool 3: Healthy lifestyle practices scale.

It was used to assess visually impaired students' reported practice regarding healthy lifestyles. It included 50 Likert scale questionnaires rated as (never, sometimes, or always) and consisted of six parts: nutritional status assessment (10) items; physical activity assessment (11) items; health practices (activity of daily living) (8) items; stress management assessment (8) items, interpersonal relations (7) items; and spiritual health assessment (6) items. This tool was used as pre- and post-test.

Scoring system for Healthy lifestyle practices scale

It comprised three Likert scale questionnaires. A Likert scale questionnaire is a type of survey where participants are required to indicate their level of agreement with a particular statement or viewpoint (Joshi et al, 2015). The questions were designed to be answered by (always = 2, sometimes =1, and never = 0). The overall score ranged from 50 to 100. The items of the questionnaire (50) were classified and scored as poor lifestyle practices less than 50 ($\leq 50\%$) of the total score of 100, fair lifestyle practices scored from 50- to less than 75 (50% to $<75\%$) and good lifestyle practices 75- 100 ($\geq 75\%$) out of the total score 100.

Content validity:

The content validity of the study tools was evaluated by a panel comprising three expert academics who specialize in community, psychiatric, and mental health nursing. In order to evaluate the precision of the items on the tool in accurately representing the information in the specific field of interest, the researchers requested the experts to establish a correlation between each objective and its corresponding item, evaluate the item's pertinence to the content covered by the objectives, and make a determination based on this assessment. Modifications were made in response to the panel's feedback.

Reliability: Cronbach's Alpha was used to determine the internal consistency of the developed tools, which were (0.99 & 0.774) respectively, for the knowledge and practice scale.

Ethical Considerations: Primary approval was obtained from the Ethics Committee of the Scientific Research Faculty of Nursing, Damanhour University (Code 81). The Ministry of Social Solidarity and the Director of the chosen institution for visually impaired students in the Cairo governorate granted official authorization. The researcher informed visually impaired students about the purpose and nature of the study. Additionally, the researcher underscored that all subjects are granted the autonomy to resign from the study at any given time and that participation is entirely voluntary. Students who agreed to participate in the study provided oral consent, while parents provided written informed consent. The data was encoded to guarantee anonymity and confidentiality. The collected data will solely be employed for this research and will not be repurposed in any subsequent study without their explicit consent.

Pilot study: The pilot study was done on 10% of the total sample (5 student) to examine the feasibility of the study, clarity of questions and time needed to complete the study tools. Based on the results, no modification was done and students participated in the pilot study were included in the actual study.

Procedures: The actual fieldwork took place over five months, from the end of October 2022 until the beginning of March 2023. The study was conducted in four stages: assessment, planning, implementation, and evaluation.

Assessment phase:

After obtaining the official approvals, the assessment phase commenced. This phase involved evaluating visually impaired students' knowledge and reported practice regarding a healthy lifestyle using the study instruments. The researcher conducted individual interviews with each student to guarantee the completion of all components of the instruments. The time spent filling out the questionnaire ranged from 15-25 minutes. Throughout the one-month evaluation period, the researcher conducted three daily pretest field visits to the school from 9 a.m. to 2 p.m.

Planning and designing phase:

Based on assessment results and a comprehensive review of relevant literature, the researcher designed the educational program utilizing AT methods (Braille and screen reader).

Program preparation: After reviewing the recent literature, the researcher developed the healthy lifestyle domain content in Arabic, and the program content was revised and translated from Arabic to Braille in the library of Al-Nour Wal -Amal Association "ANWA." In order to ensure alignment

between the Arabic program's content and the Braille method, as well as compatibility with screen reader software, the evaluation of the translated content into Braille was conducted by a renowned researcher. This researcher is an expert professor of Modern and Contemporary History at Suez Canal University's Faculty of Arts and a member of the Al-Nour Wal-Amal Association, which focuses on supporting individuals with visual impairments.

Implementation phase:

The designed program was implemented through a series of teaching sessions, which were conducted over the course of 6 sessions.

- **The initial session:** Served as an introduction, during which the researcher established a connection with the students and provided a basic explanation of knowledge related to healthy lifestyle domains.
- **The second session:** Focused on the topic of physical well-being, healthy nutrition and the importance of periodic checkups.
- **The third session:** focused on interpersonal relations, communication and healthy sleeping.
- **The fourth session:** Help students to gain information about stress; definition, causes, risk factors and stress management.
- **The fifth session:** Included spiritual health information and positive thinking.
- **The sixth session:** Help students to learn how to prepare healthy meal according to food pyramid, methods of hand washing, stretching and strengthening exercise, communication skills, stress management techniques (breathing exercises) and emotional regulation.

Sessions were conducted as instructional classes using pre-designed teaching materials. The duration of the session ranged from 30 to 45 minutes. The students were divided into two groups according to their educational grade. The first group consisted of students in the preparatory stage, whereas the second group was students in secondary school. The researcher elucidated the program's content to these students in accordance with their respective age groups. Furthermore, the students were divided into small groups of "5-10" students. The researcher implemented the program in each group similarly and gave feedback at the end of each session. Teaching methods to achieve the program objectives were "discussion, lectures, brainstorming, and role play, and Braille handout/booklet/ brochures distributed to students at the end of the educational program.

Evaluation phase:

Following a two-months period of implementing the program (post-test), an assessment was conducted to determine the impact of AT on the adoption of a healthy lifestyle by visually impaired students. The

purpose was to determine if the intervention's goals had been achieved. The same tools (tools I and II) were used.

Statistical Analysis

The data collected was tabulated and analyzed using the Statistical Package for the Social Science (SPSS) version 27. Frequency, mean, and standard deviation

were used as descriptive statistics. The visually impaired student's responses were analyzed using inferential statistics, specifically the t-test, chi-square test, and Pearson correlation coefficient. The p-value was set at 0.05, indicating that a result was deemed non-significant if it was >0.05 and significant if it was ≤ 0.05.

Results

Table (1): Distribution of the student's personal data (N=50).

Student's personal data	No	%
Sex		
Males	27	54.0%
Females	23	46.0%
Educational Level		
1st prep	17	34.0%
2nd prep	3	6.0%
3rd prep	8	16.0%
1st sec	15	30.0%
2nd sec	6	12.0%
3rd sec	1	2.0%
Parent's Characteristics		
Father education		
Illiterate		
Read And write	9	18.0%
Basic Education	4	8.0%
Secondary Education	24	48.0%
University Education	11	22.0%
Mother education		
Illiterate	6	12.0%
Read And write	9	18.0%
Basic Education	7	14.0%
Secondary Education	18	36.0%
University Education	10	20.0%
Mothers' occupation		
Working	11	22.0%
Not working	39	78.0%
Father s' occupation		
Working	44	88.0%
Not working	6	12.0%

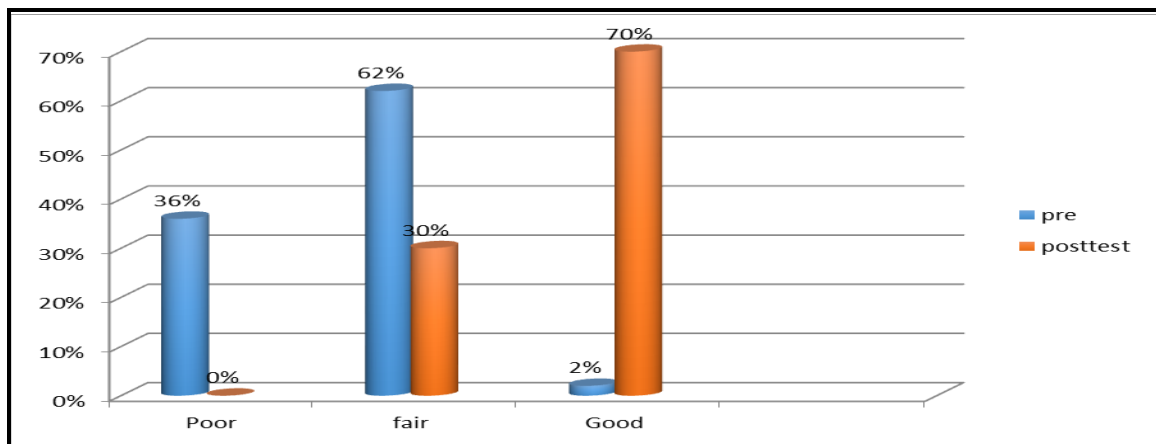


Figure (1): Distribution of student's total knowledge levels before, and after the program (N=50)

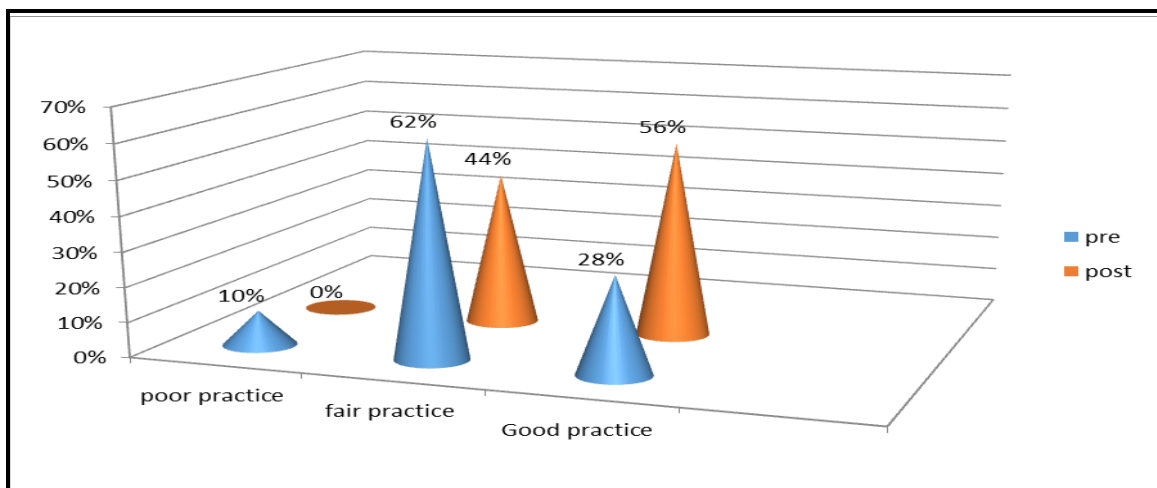


Figure (2): Distribution of student's total practice levels before, and after the program (N=50)

Table (2): Difference between mean scores of knowledge dimensions pre and post-tests (N=50)

Knowledge dimensions	Pre		Post		P value
	Mean	SD	Mean	SD	
Nutrition	6.66	2.89	12.56	3.28	< 0.001
Physical activity	5.12	2.34	7.04	1.12	< 0.001
Health knowledge	7.22	2.62	10.26	1.54	< 0.001
Stress management	3.34	1.48	4.84	1.33	< 0.001
Interpersonal relationship	3.76	1.53	5.22	1.17	< 0.001
Spiritual health	2.10	1.85	4.82	2.05	< 0.001
Total knowledge score	28.20	7.89	44.74	5.62	< 0.001

*The mean difference is statistically significant at the level of 0.05.

Table (3): Difference between mean scores of practices dimension pre and post-tests (N=50)

Practice dimensions	Pre		Post		P value
	Mean	SD	Mean	SD	
Nutrition	12.22	3.97	15.34	2.94	< 0.001
Physical activity	11.08	4.06	12.68	5.85	0.044
Health practices (activity of daily living)	11.56	1.98	13.80	2.02	< 0.001
Stress management	10.62	3.46	12.14	2.71	0.011
Interpersonal skills	9.06	2.74	11.64	2.87	< 0.001
Spiritual health	9.18	2.44	10.36	2.51	0.042
Total practice score	63.72	13.23	75.96	13.35	< 0.001

*The mean difference is statistically significant at the level of 0.05.

Table (4): Difference between mean scores of total healthy lifestyle knowledge and practice scores pre and post-test (N=50).

Variables	Pre		Post		P value
	Mean	SD	Mean	SD	
Total knowledge score	28.20	7.89	44.74	5.62	0.001*
Total practice score	63.72	13.23	75.96	13.35	0.001*

*The mean difference is statistically significant at the level of 0.05.

Table (5): Correlation between demographic characteristics of the students and total knowledge scores and total practice scores in pre and post-tests (N=50).

Demographic characteristics	Total knowledge scores		Total practices scores	
	r	p	r	P
Age	.880	.382	.350	0.762
Sex	0.127	0.455	.339	0.001*
Educational level	.966	.430	.380	0.001*

*The correlation is significant at the 0.01 level (2 tailed).

Table (6): Correlation between total knowledge scores and total practice scores in pre and post-tests (N=50).

Variables		Total knowledge score pre	Total knowledge score post
Total practice score pre	Correlation Coefficient	-0.034-	0.135
	P value	0.815	0.351
	N	50	50
Total practice score post	Correlation Coefficient	0.127	0.331
	P value	0.380	*0.019
	N	50	50

*The correlation is significant at the 0.01 level (2 tailed).

According to **Table (1)**, 54% of the students were male and 46% were female. The average age of the students was 14.88 years, with a standard deviation of ± 1.65 years. In terms of educational level, 34% of the students were enrolled in 1st-grade preparatory schools, while 6% and 16% were in 2nd and 3rd-grade preparatory schools, respectively. Additionally, 30% of the students were in 1st-grade secondary school, while 12% and 2% were in 2nd and 3rd-grade secondary school, respectively. Regarding the characteristics of the parents, 48% of the students' fathers possessed a secondary level of education, and 88% of them were employed. In contrast, 36% of student's mothers had secondary education, and 78.0% were not working.

Figure (1): Demonstrates an improvement in the post-test results compared to the pre-test. The percentage of students with adequate knowledge increased to 70% compared with 2% in the pre-test. In addition, the percentage of poor knowledge decreased to zero percentage compared to 36% in the pre-test, supporting the first research hypothesis.

Figure (2): Indicates an improvement in the post-test results compared to the pre-test. The percentage of students with good practice increased to 56% compared with 28% in the pre-test. In addition, the percentage of poor practice decreased to zero compared to 10% in the pre-test, supporting the second research hypothesis.

Table (2): Reflected highly statistically significant difference between all lifestyle knowledge dimensions scores among visually impaired students in pre and post-tests (P value= .0001). **This table supports the first research hypothesis.**

Table (3): Showed a highly statistically significant difference between all lifestyle practice dimensions scores among visually impaired students in pre and post-tests (P value= .0001). **This table supports the second research hypothesis.**

Table (4): Demonstrates a significant statistical disparity between visually impaired students' overall knowledge and practice scores in the pre-and post-tests (p-value = 0.001).

According to **Table (5)**, there is a highly statistically positive correlation between school students' total practice scores, students' sex and educational level ($p = 0.001^*$ & $p = 0.001^*$), respectively. However, there was no statistically significant correlation between students' total knowledge scores, age, sex, and education ($p = .382$, 0.455 , and $.430$) respectively. As shown in **Table (6)**, there was a highly statistically positive correlation between total knowledge scores and total practice scores in post-test compared to pretest (P value = 0.019).

Discussion

An individual's lifestyle choices have a substantial impact on their overall health. Healthy habits encompass various aspects of life, such as nutrition, physical activity, stress management, interpersonal connections, and spiritual development (**Al-Qahtani, 2019**).

This study aimed to assess the effect of using assistive technology on healthy lifestyle among visually impaired students.

The current study's findings displayed a highly statistically significant difference between students' total knowledge and total practice scores regarding a healthy lifestyle in pre-and post-tests. In harmony with the study results by **Mohamed et al. (2021)**, who examined the healthy lifestyle of adolescent girls in secondary school in Iraq and revealed that, there was a statistically significant correlation between the participants' knowledge and their overall adherence to a healthy lifestyle. This finding can be explained by the beneficial effect of the AT program on raising visual impaired student's awareness and increasing their knowledge reflected in practice.

Also, these results were congruent with **Abdelazeem (2022)**, who examined healthy lifestyle habits among visually impaired adolescent students at El-Noor School in Minia Governorate. The study revealed that a significant proportion of visually impaired pupils did not adhere to healthy lifestyle practices. Therefore, it is recommended that health education and promotion initiatives for visually impaired students be implemented to alter their understanding

of several facets of healthy living behaviors, particularly physical exercise and nutrition.

The findings align with **Al-Zboon's (2020)** study, which examined the perceptions of Jordanian teachers regarding assistive technology for visually impaired students. The study emphasizes AT's pivotal significance in visually impaired students' lives, facilitating their ability to live healthier lives and enhancing their overall quality of life. The findings of the current investigation is supported by the research conducted by **Bin Tuwaym & Berry (2018)** on the use of assistive technology for visually impaired students. Their study demonstrated that the proper utilization of AT can enhance educational achievements, promote self-sufficiency among students with disabilities, and encourage the adoption of a healthier lifestyle.

The current study's findings showed a statistically significant difference between the students' sex and educational level and their total healthy lifestyle practice scores. **Abdelazeem (2022)** discovered a statistically significant disparity between gender and overall scores in healthy lifestyle behaviors, which aligns with the current findings. Therefore, in line with the findings of **Bakouei et al, (2019)**. It can be inferred that a direct correlation exists between higher educational attainment and the adoption of a healthy lifestyle. This finding can be attributed to the influence of education in reducing unhealthy behaviors. **Shu-Ling et al., 2018**, observed no significant association between gender and mean scores of health-promoting lifestyle, which is inconsistent with the current findings. The divergence in methodological frameworks may be due to the disparity between the two investigations.

However, the study findings showed no statistically significant difference between age or educational level and total knowledge scores. In contrast to the findings of **Al-Qahtani (2019)**, who investigated the health-promoting behaviors of female students in healthcare and non-healthcare fields in Kingdom of Saudi Arabia, it was concluded that there is a notable and positive relationship between the students' overall knowledge of a healthy lifestyle and their level of education.

Conclusion

The present study's findings indicate a significant improvement in the overall knowledge and practice scores of visually impaired students regarding a healthy lifestyle. This improvement can be attributed to the implementation of an educational program that incorporated AT.

Recommendations

According to the findings of the present study, the following recommendations can be proposed:

1. Enhance the role of community health nurses in developing health education programs, flyers, and pamphlets that address the risk factors associated with adopting an unhealthy lifestyle.
2. Highlight the significance of cooperation between community and psychiatric nurse to implement a further comprehensive educational program for visually impaired students encompassing all aspects of a healthy lifestyle.
3. Implement health education initiatives to enhance the knowledge and understanding of healthy lifestyle practices among teachers and school administrators in visually impaired schools
4. Conduct a follow-up assessment to validate the long-term effect of using AT on improving the healthy lifestyle of students with visual disabilities.

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