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Knowledge, attitudes, perceptions and challenges of teenagers with visual disabilities regarding physical fitness and exercise

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ABSTRACT

Physical fitness in teenagers with visual disabilities has not been researched adequately in Sri Lanka and internationally leading to lack of awareness in this regard by healthcare providers. This hinders the designing and implementation of physical fitness programs for them. This article explores the knowledge and attitudes of teenagers with visual disabilities on physical fitness and exercise, the types of exercises they prefer, accessibility and barriers they have for physical activities. This descriptive cross-sectional survey of 55 teenagers with visual disabilities was conducted using an interviewer-administered questionnaire at the School for the Blind and Deaf, Dowa, Badulla. The survey found that they had inadequate knowledge about physical fitness; 81.8% had some knowledge with significant gaps while 18.2% had no knowledge. Everyone had positive attitudes regarding physical fitness and exercise. The majority preferred walking (35.95%), aerobic exercises (35.95%) and running (28.10%) rather than gym exercises and team sports (0%). Accessible exercises were walking, running, and aerobic exercises. Common barriers for them to engage in exercises were the lack of dedicated places to exercise with individuals with similar disabilities (92.7%), lack of adapted exercise equipment (100%), lack of learn-to-exercise programs (100%) and not knowing about suitable exercises (100%). The survey found that visually disabled teenagers had gaps in knowledge and attitudes regarding physical fitness and exercise. Programs should be developed and implemented at school level to improve their knowledge about physical fitness and suitable exercises. Such programs should address the identified issues while improving accessibility of exercises and removing identified barriers.

KEYWORDS:

Visual disability; Teenagers; Physical fitness; Exercise

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Introduction

Globally, at least 2.2 billion people have some type of vision impairment (WHO, 2019). Visual disability is not an intrinsic feature of an individual, but a result of decreased body function and structure, limitation of activities and restriction of participation due to visual impairment (WHO, 2003). Physical fitness is a measure of the body's ability to function efficiently and effectively in work and leisure activities, to be healthy, to resist hypokinetic diseases, and to meet emergencies (Caspersen et al., 1985). Exercise is a subset of physical activity that is planned, structured and repetitive, and has as a final or intermediate objective of improvement or maintenance of physical fitness (Caspersen et al., 1985). As such, exercising is a key element of an individual's physical fitness level.

Children and adolescents with visual disability can enhance postural stability, promote navigation performance (Rogge et al., 2021) and enhance psychological well-being (Sweeting et al., 2020) by doing physical activities. But children and adolescents with visual disabilities are more prone to have sedentary lifestyles (Inoue et al., 2018) and they have a lower physical activity level than individuals without visual disability (Rogge et al., 2021). For this reason, people with visual disability have low physical fitness levels (Inoue et al., 2018) and are more prone to suffer from chronic conditions (Sweeting et al., 2020). These result in a substantial deterioration in health-related quality of life (Park et al., 2015).

A positive perception regarding physical fitness and exercise is crucial for maintaining a good physical fitness level. There can be diverse elements contributing to physical fitness and exercise among the population with visual disability. In our research, we explored the following: (1) Knowledge about physical fitness and exercises, (2) Attitudes regarding physical fitness and exercises, (3) preference for and accessibility of exercises and (4) Barriers to engaging in exercise.

WHO recommends that children and adolescents living with a disability should do at least one hour of moderate to vigorous intensity aerobic exercises and physical activities per day, while muscle strengthening and bone strengthening exercises are recommended three days per week (WHO, 2019). WHO also recommends limiting time spent being sedentary as much as possible to prevent physical disability (Inoue et al., 2018). Therefore, it is very important to share knowledge about physical fitness and exercises, identify preferences for and accessibility of exercises and to remove barriers which are experienced when doing exercises.

The objective of this article is to create awareness on an underexplored but very important topic. The findings would also be beneficial to design further research.

Methodology

Research design

The research uses a cross-sectional descriptive study design which is a type of study that collects data from participants at a single point in time. It aims to describe the characteristics or behaviors of a population at that specific moment (Aggarwal & Ranganathan, 2019).

Study population and study setting

The study population was visually disabled teenage students between 13-19 years of age at the School for the Blind and Deaf, Dowa, Badulla, Sri Lanka. The reasons for selection were that students of this age group are generally more physically active, are generally known to be concerned about body image and have an interest in new experiences. Those with disabilities other than visual disability were excluded as well as those with intellectual limitations.

Sample size and sampling technique

The sample consisted of 55 teenagers. A purposive sampling method was used for selecting the participants based on their availability and willingness to take part in the study.

Data collection instrument

The data collecting tool was an interviewer-administered questionnaire. It was specially designed for this study by reviewing the literature and modifying a questionnaire used in a similar study (Stuart, Lieberman, & Hand, 2006; Greguol, Gobbi, & Carraro, 2015). This modified questionnaire assessed the demographic data and all the objectives of the study; knowledge about physical fitness and exercise, attitudes regarding physical fitness and exercise, preference for and accessibility of different types to exercise, and barriers for engaging in exercises. The researcher pre-tested the questionnaire with ten students to assess any difficulty in understanding the sentences, phrases or words in the questionnaire. All participants indicated that they were able to answer the questionnaire with ease.

Ethical approval

The Ethics Review Committee of the Faculty of Medicine, University of Colombo granted ethical approval for the study in 2021.

Results

Socio-demographic characteristics

The age of participants ranged between 13 to 19 years. Of the 55 participants, 58.2% (n=32) were males and 41.8% (n=23) were females.

Knowledge about physical fitness and exercise among teenagers with visual disability

Knowledge of Participants about physical fitness

The participants were asked to indicate the meaning of physical fitness according to their understanding. Of the participants, 81.8% (n=45) responded to this question as follows: 34.5% (n=19) indicated the meaning as being healthy; 25.5% (n=14) mentioned it as the vigor of the body; 12.7% (n=7) indicated that it meant being without illness; and 9.1% (n=5) indicated that it meant being active. Of the participants, 18.2% (n=10) had not responded to the question.

The participants were also asked about the relationship between physical fitness and exercise. 100% of them indicated that exercise is needed to improve physical fitness.

Importance of exercise to the participant

The study assessed the participant's perceptions about the importance of exercise using a 5-point scale (see Table 1).

Table 1: Importance of exercise to the participant

How important is exercise to you?	frequency (n)	percentage (%)
Extremely important	5	9.1%
Very important	32	58.2%
Moderately important	18	32.7%
Slightly important	0	0%
Not important	0	0%

Importance of exercise by gender

Table 2 (below) breaks down the participant's responses about the importance of exercise by gender.

Table 2: Importance of exercise by gender

Importance of exercise to me	male		female	
	frequency (n)	percentage (%)	frequency (n)	percentage (%)
Extremely important	5	15.6%	0	0%
Very important	21	65.6%	11	47.8%
Moderately important	6	18.8%	12	52.2%
Slightly important	0	0%	0	0%
Not important	0	0%	0	0%

Attitudes of visually disabled teenagers regarding physical fitness, exercise, and physical activities

A 4-point Likert scale was used to identify the attitudes of visually disabled teenagers regarding physical fitness and exercise (see Table 3).

Table 3: Attitudes of visually disabled teenagers regarding physical fitness, exercise, and physical activities

	strongly agree (%)	agree (%)	disagree (%)	strongly disagree (%)
I enjoy exercise	38.2%	61.8%	0%	0%
Exercising takes too much of my time	0%	0%	69.1%	30.9%
Exercise tires me	0%	18.2%	74.5%	7.3%
Exercise increases my muscle strength	0%	83.6%	16.4%	0%
Exercising makes me feel relaxed	12.7%	69.1%	18.2%	0%
I am too embarrassed to exercise	0%	9.1%	74.5%	16.4%
Exercising increases my level of physical fitness	20%	80%	0%	0%
Exercise increases my muscular endurance	16.4%	83.6%	0%	0%
Exercise improves my body composition	0%	36.4%	63.6%	0%
Exercise helps me to improve flexibility	16.4%	78.2%	5.5%	0%
My cardiovascular endurance is improved by exercise	14.5%	78.2%	7.3%	0%
Exercise allows me to carry out normal activities without becoming tired	10.9%	89.1%	0%	0%
Exercising is hard work for me	0%	0%	78.2%	21.8%
Exercise improves overall body function	0%	81.8%	18.2%	0%

Preference for and accessibility of exercises

100% of participants indicated that they spent time doing exercise and physical activities.

Perceived exertion during exercise

The Borg Rating of the Perceived Exertion Scale was used to identify participant's perceptions about their level of exertion when doing exercise and physical activities. 23.6% (n=13) of participants indicated a value of 7.5 (extremely light activity), 43.6% (n=24) indicated 9 (very light activity), and 32.7% (n=18) indicated 11 (light activity).

Exercise preference of the participants

The participants had the opportunity to select multiple responses from the options provided (see Figure 1).

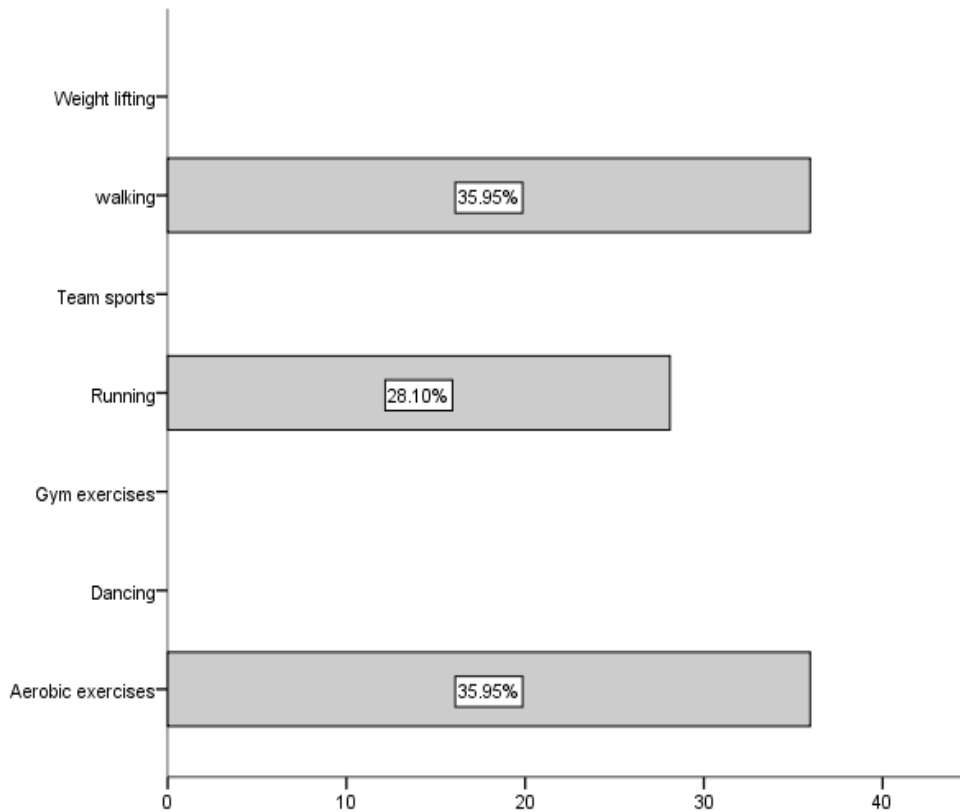


Figure 1: Exercise preference of the participants

Exercise preference in relation to gender

The study also assessed the exercise preferences of participants by gender. Walking and aerobic exercises were preferred by 100% of male and female participants while running was preferred by 100% of males and 47.8% of females.

Time spent on exercise or physical activity

The time spent by participants on exercise or physical activity was assessed using 4 options (see Table 4).

Table 4: Time spent with exercise or physical activity

How much time is spent on exercise/ physical activity per day	frequency (n)	percentage (%)
Less than one hour	12	21.8%
One to three hours	43	78.2%
Three to five hours	0	0%
More than five hours	0	0%

Time spent on exercise or physical activity per day in relation to gender

Table 5 (below) provides the gender breakdown of the responses relating to time spent on exercise or physical activity.

Table 5: Time spent on exercise or physical activity per day in relation to gender

Time spent on exercise per day	gender		x2	p-value
	male	female	3.895	0.048
Less than one hour	12.5%	34.8%		
One to three hours	87.5%	65.2%		
Three to five hours	0%	0%		
More than five hours	0%	0%		

Frequency of doing exercise or physical activity for a week

The frequency of doing exercise or physical activity per week was assessed using 4 options: one to two times a week, three to four times a week, five to six times a week, and more than six times a week. 20% of participants indicated one to two times a week and 80% indicated three to four times a week.

Barriers to exercise and physical activities

A 3-point Likert scale was used to identify the barriers to exercise which are experienced by visually disabled teenagers (see Table 6).

Table 6: Barriers to performing exercise and physical activities

Barriers to do exercise	never	sometimes	very often
Lack of skills	61.8%	38.2%	0%
Lack of exercise equipment	0%	69.1%	30.9%
Physical conditions due to my disability	70.9%	29.1%	0%
Not knowing where to go to exercise	3.6%	47.3%	49.1%
Not knowing how to use exercise equipment	16.4%	45.5%	38.2%
Lack of a place to exercise with individuals having similar disabilities/ conditions	7.3%	41.8%	50.9%
Lack of adapted exercise equipment	0%	49.1%	50.9%
Lack of trained staff for assistance	0%	67.3%	32.7%
Lack of family support	74.5%	23.6%	1.8%
Lack of a learn-to-exercise program	0%	30.9%	69.1%
Not knowing how to exercise	0%	32.7%	67.3%
Pain or discomfort	80%	20%	0%
Fear of injury	80%	20%	0%
Lack of motivation	81.8%	18.2%	0%
The inconvenience of showering or grooming	69.1%	29.1%	1.8%
Fear of danger or not being safety	27.3%	47.3%	25.5%
Unexpected obstacles	0%	94.5%	5.5%
Dim or bright lights	0%	100%	0%
My low vision or visual impairment	85.5%	14.5%	0%

Association between gender and the importance of exercise

A Chi-square test was used to analyze the association between gender and perceptions about the importance of exercise for teenagers with visual disability. This test is used to observe the relationship between variables. The results showed a statistically significant difference between responses by male and female participants ($p < 0.05$; $X^2 = 8.890$, $p\text{-value} = 0.012$). A majority (65.6%) of male participants responded that exercise was very important for them and a majority (52.2%) of female participants responded that exercise was 'moderately important' for them.

Association between gender and exercise participation

A Chi-square test was used to analyze the association between gender and exercise participation. According to the results of this study, the time allocation for exercise was higher in male than female visually disabled teenagers. The results showed a statistically significant difference ($p < 0.05$) between males and females ($X^2 = 3.895$, $p\text{ value} = 0.048$).

Discussion

This article explored the perception of teenagers with visual disabilities towards physical fitness and exercise. The participants' main perceptions about the meaning of physical fitness were 'being healthy' (34.5%) and 'vigor of the body' (25.5%). Other perceptions were 'being without illnesses' (12.7%) and 'being active' (9.1%). Published research which assessed knowledge about physical fitness and exercise in persons with visual disability could not be found despite searching Hinari from the University of Colombo Library, Google Scholar, and PubMed, in order to compare with our study results. According to the results of the present study, teenagers with visual disability had an incomplete idea about physical fitness, but saw a positive relationship between physical fitness and exercise.

A study conducted by Kirk & Haeghele (2019) on 214 adults with visual disability measured the perceived expectancy beliefs about physical activities or exercise using a seven-point Likert scale (one for "Not important" and 7 for "Very important") and the mean reported score for the expectancy beliefs factor was 4.12 ($SD \pm 1.45$). Another study on the beliefs about physical activity among children who are visually impaired and their parents found that children placed more importance on physical activities (Stuart, Lieberman, & Hand, 2006). Similarly, the results of the present study show that exercise was perceived as important to different levels by the participants (58.2% perceived exercise as very important while 9.1% perceived it as extremely important), but no one had indicated that exercise was not important to them. The study identified a significant difference between males and females regarding the perceived importance of exercise ($X^2 = 8.890$, $p\text{-value} = 0.012$). More male participants (65.6%, $n=21$) believed that exercise was very important for them

while a majority of female participants (52.2%, n=12) believed that exercise was moderately important for them.

A study done in Turkey on 100 students with visual disability indicated that they have positive attitudes toward physical education and sports (Dalbudak et al., 2016). Our findings are somewhat similar as teenagers with visual disability in our study have positive attitudes regarding physical fitness, exercise, and physical activities as well.

Some previous studies have found children with visual disability have lower levels of participation in physical activity than their sighted peers (Houwen, Hartman, & Visscher, 2010; Kroksmark & Nordell, 2001). In contrast, our findings show that all participants took part in physical activities and exercises and that visual impairment did not have a negative effect on participation. The 13-19 year age group is generally more active and playful. This may be the reason for the higher value placed on exercise participation.

In the present study, participants were asked about their perceived exertion during exercise using the Borg Rating of Perceived Exertion Scale (where 6 means 'no exertion at all' and 20 means 'maximum possible exertion'). In a previous study on the impact of rope jumping exercise on the physical fitness of visually impaired students, the Borg Rating scale values ranged from 11 to 15 (Chen & Lin, 2011). In another study done on visually disabled young adults using an exercise cycle test, the Borg Rating scale values were 9, 11 and 13 (Buckley, Eston, & Sim, 2000). The findings of the present study show that Borg Rating scale values during exercise were 7.5, 9 and 11. This suggests that participants did not perceive exercising as a hard job.

To identify the preferences for and accessibility of exercises, participants had the opportunity to select multiple responses. These included walking, running, team sports, aerobics, gym exercise, weightlifting, dancing, and others. The most preferred exercises were walking (35.95%) and aerobics exercises (35.95%). The second most preferred exercise was running (28.10%). However, running was the least frequently chosen response by female participants. Only 47.8% of female participants chose running as an option. Other options were not selected because they did not have access to those exercises.

WHO recommends doing at least an average of one hour of moderate to vigorous intensity aerobic exercises and physical activities per day as well as muscle strengthening and bone strengthening exercises three days per week for children and adolescents living with a disability (WHO, 2019). A study done in China identified that students with visual disability do an average of 168.62 minutes of moderate to vigorous physical activities every day (Qi et al., 2020). Another study done among adults with visual disability (aged 18 years or older) in America indicated that they do 413.79 minutes of moderate to vigorous physical activity per week (Haegele et

al., 2016). The findings of our study show that a majority (78.2%) of participants had a range of 60-180 minutes (1 to 3 hours) of physical activities per day. 80% of participants had engaged in 180-720 minutes of walking, running and aerobics exercises per week.

Physical fitness has 5 health-related components which are muscular strength, muscular endurance, cardiovascular endurance, flexibility, and body composition (Park et al., 2021). Walking, running and aerobic exercise are not enough to improve all these components (Park et al., 2021). The school from which participants were selected has an aerobic exercise program. All participants engage in this program and have extra time to do physical activities with their colleagues. But they do not engage in the muscle and bone strengthening exercises, like weightlifting and gym exercises, as they had no access to these.

Haegele et al. (2016) identified that there was a significant difference between the participation of males and females in exercises. According to the results of our study, time allocation for exercise was higher in male teenagers with visual disability. The results showed a statistically significant difference ($p < 0.05$) between males and females. ($X^2 = 3.895$, $p \text{ value} = 0.048$).

Our study reveals a set of barriers that participants experienced in doing exercises. Major barriers that were identified include the lack of a place to exercise with individuals having similar disabilities and conditions, lack of adapted exercise equipment, lack of a learn-to-exercise program, not knowing how to exercise, not knowing how to use exercise equipment, lack of trained staff for assistance, fear of danger or not being safe, unexpected obstacles and dim or bright lights.

Likewise, one of the previous studies done with 22 children and adolescents with visual disability identified the main perceived barriers to physical activities as lack of security, motivation, professional training and information about available physical activity programs (Greguol, Gobbi, & Carraro, 2015). Another study identified lack of knowledge and skills, the child's preferences, fear, parental behavior, negative attitudes to disability, inadequate facilities, lack of transport, programs and staff capacity, and cost as the barriers to physical activity (Shields, Synnot, & Barr, 2012). Linsenbigler et al. (2018) identified lack of professional preparation for teachers and the attitudes of the public towards people with disabilities as barriers to exercise.

Conclusion, recommendations, and limitations

Conclusion

According to the findings of our study, knowledge was deficient regarding physical fitness and exercise among teenagers with visual disability. But they believed that exercise was very important to maintain a good physical fitness level

and they had positive attitudes toward exercise and physical fitness. The exercises accessible to them were walking, running, and aerobic exercises. These can improve muscular and cardiovascular endurance. It is important to introduce strengthening and stretching exercises for them to address other components of health-related physical fitness, including muscular strength, flexibility and body composition. This article has also revealed the barriers which reduce the accessibility of exercise for teenagers with visual disability.

Recommendations

The relevant authorities and policy makers should take necessary steps to increase accessibility of exercises for teenagers with visual disability; to create adaptive exercise devices; and to create suitable and safe environments for this population to exercise. The teachers of students with visual disabilities should be educated and trained on imparting the necessary knowledge and skills to their students about physical fitness and exercise. Future research could explore this area in more detail and depth, measure the physical fitness levels of the population with visual disability and recommend suitable exercise interventions.

Limitations

The study was carried out only in one setting due to logistical reasons. Differences that could arise due to different religious, cultural and socio-economic backgrounds were not addressed during this study. The fact that there was a readily accessible aerobic exercise program in the study setting may have promoted the students to engage in exercises. Therefore, the results of this study may not reflect the general Sri Lankan teenage population with visual disability.

Conflict of interest

The authors have no conflict of interest to declare.

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