



Impact of an educational program on knowledge and practice for deaf children about protection from car accidents

¹ Laith Mahmoud Alosoufe, ² Hekmat Ebrahim Abd EL-Kareem and ³ Asmaa Abed Al_ Aziez Mohamed

¹ Assistant Lecturer, Faculty of Nursing and Health Science, AL- Hussein Bin Talal University, Hashemite Kingdom Jordan

² Professor of Pediatric Nursing, Faculty of Nursing, Assiut University, Egypt.

³ Assistant Professor of Pediatric Nursing, Faculty of Nursing, Assiut University, Egypt.

Abstract

Background: Hearing impairment is a general term indicating the presence of disability that may range in severity from slight to profound hearing loss.

Aim: to determine the impact of an educational program on knowledge and practice for deaf children about protection from car accidents.

Design: Quasi - experimental research design was used in this study.

Subjects: The study sample composed of 69 school age and adolescent deaf children.

Setting: The study was conducted at The Holy Land Institute for the Deaf, Jordan - Salt governorate.

Tools: Data were collected by utilizing the designed interview Questionnaire that consists of sociodemographic data, deaf children knowledge and practice about protection from car accident, theoretical and practical educational program.

Results: highly significant difference between pre and post - test on studied deaf children knowledge and practice, deaf children have more satisfactory after applied educational program on both knowledge and practice.

Conclusions: an educational program had a great effect on deaf children knowledge and practice about protection from car accident.

Recommendations: were suggested that ongoing in-service educational program for deaf children at other places to improve knowledge and practice.

Keywords: Educational program, knowledge and practice, deaf children, car accidents, protection

Introduction

Hearing is one of our five senses. It gives us access to sounds in our general surroundings. Hearing loss effects on the life of the child and family. Since dialect and correspondence grow so quickly amid the initial 3 years of life, an undetected hearing loss is likely to interfere with a child's speech, language and communication with others. Hearing loss also can result in learning problems that influence a child's performance at school (Loss, 2006) [14].

Disabling hearing loss refers to hearing loss greater than 40 decibels (dB) in the better hearing ear in adults from 15 years or older and over 30 (dB) in the better hearing ear in children from birth up to 14 years old. (WHO, 2012) [23].

Deafness might viewed as a condition that keeps a person from accepting sound in all or the vast majority of its structures. Conversely, a child with hearing loss can for the most part react to sound-related boosts, including discourse. (Individual with disabilities educational act (IDEI), 2013).

Around ten thousands infants are born in the United States every year with sensorineural deafness. While the occurrence of sensorineural deafness is similar in most high-income nations and is higher in some low-income, the parents have ordinary hearing and no information of sign

language. Therefore, they ought to learn a sign language and based communication with their child by utilizing through signing. (Mellon *et al.*, 2015) [15].

Over 5% of the world's populace, 360 million people, (328 million adults and 32 million children) have debilitating hearing loss. Half of all cases of hearing loss are avoidable through essential prevention. (WHO, 2015) [24].

Comprehensively, 150 million children from birth to 18 years old assessed to living with a disability, the greater part of those debilitated children live in low and middle-income nations. (Devries *et al.*, 2014) [8].

In Egypt the number of disabled persons is 0.7% of the aggregate populace. Mental impediment looks like (22.6%), while visual deficiency, deafness, idiocy, deafness and dullness and different inabilities take after (9.5%), (3.5%), (2.5%), (6.5%), and (55.4%) respectively. In Assiut governorate the disabled children aged between 5 up to 15 years (6.5%). (The Census of Population and Housing Condition, 2006) [20].

In Jordan, hearing disabilities considered in second place in terms of prevalence after mental incapacities, hearing disability number is about 3,500 persons (1%) of aggregate number disabilities (Graby, 2015) [9].

According to (WHO, 2015) ^[24] road traffic accidents about more than 260.000 passengers in youngsters and youth aged 10to19 years. Children represented for 21% of all street traffic injuries resulting in deaths worldwide. Universally, road traffic injuries consider the main source of death in 10–19 year olds. Around 66% of child road traffic injury deaths happened in the South-East of Asia and the Western Pacific districts; anyway Africa and the Eastern Mediterranean areas have the most astounding rates of fatalities.

Hearing disabled children's stance demonstrates a procedure of compensation for lack of auditory. Studies have demonstrated that consultation disabled youngsters have static and dynamic equalization inabilities and that their physical adaptation is lower than that of nondisabled peers. Gross motor functions are fundamental to balance and gait while delayed motor development may affect balance and gait in children with hearing impairment. (Uysal, *et al.* 2010) ^[22].

At school, might be presented to various unsafe circumstances in classrooms, on the play area amid break, or on the games field amid physical instruction or sorted out sports. By law, schools must uncover youngsters with handicaps to a scope of school exercises that advance their physical, passionate, and social improvement and set them up for autonomous living. Individual instructive program IEPs and vast natural appraisals are components through which damage counteractive action procedures can be presented, kept up, and modified in school for the more noteworthy security of children with incapacities (Ramirez, *et al.* 2010) ^[16].

In a general sense, the satisfaction of the essential human privileges of youngsters with inabilities relies upon veritable acknowledgment by their families, networks, social orders and governments as equivalent natives. It is significant that the lion's share of existing laws and approaches on inability are obsolete, as well as not organize issues of handicap. (The African child policy forum, 2011) ^[19].

Aim of the study

To determine the impact of an educational program on knowledge and practice for deaf children about protection from car accidents.

Research Design

Quasi-experimental research design was used in this study

Setting

The study was conducted at The Holy Land Institute for the Deaf, Jordan - Salt governorate.

Subjects

The study sample composed of 69 school age and adolescent deaf children.

Tools

An interview questionnaire was used for collecting the data of the study. It consists of four parts:

Part I: It was designed to assess personal characteristics of deaf children such as: age stage, sex, birth order, and academic achievement. (Excellent ($\geq 85.0\%$), very good (≥ 75.0), good (≥ 65.0), passed ($\geq 50.0\%$) and failed

(<50.0%) according to guidance of laws of Jordanian Ministry of Education)

Scoring system

The scoring system used for knowledge part was divided into three groups of items. In the group one which included definition of injuries, define car accident, light signal, pedestrian light sign, traffic cop, sidewalk, pedestrian tunnel, signal stopped, turn right, turn left and run over; each correct answer received 3 score and each wrong answer or a "don't know" one got zero score. In the group two which included four causes of car accident; the correct answer received 2 score and the wrong answer got zero score. Regarding the group three which included items of street parts, safe transit place, risk transit places and places to play, each correct answer accounted for 1 score and each wrong answer received zero score. The total knowledge score (65) was judged as the following: unsatisfactory ≤ 33 and satisfactory ≥ 34 .

Part II: characteristics of hearing data is divided into; the age at which deafness began (at birth, at school), family history (positive & negative), degree of hearing impairment (No impairment & slight impairment & moderate impairment & severe impairment & and profound impairment), amplification (hearing aid, cochlear implant, no usage of amplification) according to (Graham, 2014) ^[11] who used WHO report grade of the informal working group of deafness and hearing impairment program.

Part III: It was designed to determine deaf children knowledge about protection from car accident including: (definition of car accidents and injuries, causes of car accidents, traffic laws, and traffic lights such as light signal, pedestrian light sign, traffic cop, sidewalk, pedestrian walkway, footbridge, pedestrian tunnel, signal stopped, turn right, turn left, run over, street parts, safe transit places, risk transit places, places to play). This information is gained from central traffic management / Jordan general security directorate, 2016.

Scoring system

The scoring system used for knowledge part was divided into three groups of items. In the group one which included definition of injuries, define car accident, light signal, pedestrian light sign, traffic cop, sidewalk, pedestrian tunnel, signal stopped, turn right, turn left and run over; each correct answer received 3 score and each wrong answer or a "don't know" one got zero score. In the group two which included four causes of car accident; the correct answer received 2 score and the wrong answer got zero score. Regarding the group three which included items of street parts, safe transit place, risk transit places and places to play, each correct answer accounted for 1 score and each wrong answer received zero score. The total knowledge score (65) was judged as the following: unsatisfactory ≤ 33 and satisfactory ≥ 34 .

Part IV: It was designed to assess deaf children practice about protection from accidents including group of skills needed to prevent car accidents and how to decrease exposure to these accidents such as rules and etiquette of

walking on the sidewalk, rules of safe passage for roads, etiquette of riding cars and ways to avoid accidents run over.

Scoring system

The Scoring system used for practical part was that each correct answer received 2 score and every wrong answer or a “don’t know” one took zero score. The total practical score (50) was judged as the following: unsatisfactory ≤ 24 and satisfactory ≥ 25 .

Methods

The current study was carried out on five phases, involves the preparatory phase, baseline subjects assessment, designing the educational program, implementation of educational program and evaluation phase.

Phase (1) preparatory phase

1. Permission was obtained from head of The Holy Land Institute for the Deaf through written letter from the nursing college.
2. A systematic search in institute records were done to see how many of deaf children to estimate the sample size for this current study.
3. Pilot study was conducted on 10% of sample (7 children) in a selected setting to evaluate the applicability & clarity of the tools. According to this pilot study, the required modifications were made. Those children who were involved in the pilot study were included in the study.
4. The validity of the tool was obtained by experts of Nursing College at Assiut University.
5. The stability reliability of the tool was investigated by test-retest reliability method which indicated by correlation coefficient (coefficient of stability). The correlation between the test and the retest over a 2-week period was estimated ($r = 0.68, P < 0.001$). Test-retest reliability demonstrated that the correlation of all domains were very significant. In addition to the internal consistency reliability of tool was investigated by split-half procedure (coefficient alpha or Cronbach’s alpha). The correlation coefficient was 0.89.
6. The feasibility of study was checked during pilot study.
7. Educational program for protection from car accidents was prepared in light of recent literature.
8. After extensive review of relevant literature instructional media (Traffic law video) and booklet were developed.

Phase (2) baseline subjects assessment

1. Oral permission for voluntary participation was obtained from the subjects.
2. The purpose, steps and benefits of study was explained to the subjects.
3. After obtaining a verbal consent by subjects to participate in the study, and reassuring him about the strict confidentiality of any obtained information, and that the study results would be used only for the purpose of research. Then the pre-test was filled by the subjects.
4. Subjects were assigned a code number and the data were kept in a secure locker place.

Phase (3) Designing educational program

A Program was developed and implemented by researcher based on subjects' knowledge and practice regarding protection from car accident. It was supplemented with information based on review of relevant literature (nursing textbooks, journals, internet resources, etc.). Then the program was reviewed by a panel of experts before its implementation.

General objective of this program was to improve knowledge and practice of deaf children about protection from car accident.

Specific objectives of this program

The program specific objectives were that deaf children who attended the program should be able to:-

- Improve knowledge of protection from car accidents such as causes of car accident, traffic signs, street parts and safe and risk play spaces.
- Improve practice of rules and etiquette of walking on the sidewalk.
- Improve practice of rules of safe passage for roads.
- Improve practice of etiquette of riding cars.
- Improve practice of ways to avoid accidents

The program included 2 parts

1. Theoretical part: it included theoretical information about

- Hearing loss.
- Car accidents.
- Traffic laws and signs.
- Rules of safe passage for roads.
- Riding cars.
- Ways to avoid accidents.
- First aid for traffic injuries.

2. Practical part: this part covered the following

- Designed traffic law video
- Developed traffic garden
- Practices in real road

Phase (4) implementation of educational program:

The educational program was composed of 3 sessions. Program was implemented for 3 months; the duration of each session was one month.

The first session

In Subjects were divided into four groups, and then watching the designed traffic law video which included group of skills needed to prevent car accidents and how to decrease exposure to these accidents such as rules and etiquette of walking on the sidewalk, rules of safe passage for roads, etiquette of riding cars and ways to avoid accidents run over.

The second session

The traffic garden had been set up and organized to mimic real road traffic signs include light signal, pedestrian light sign, traffic cop, sidewalk, stop signal, turn right and turn left. The subjects were divided into four groups and each group applied what they learnt in the garden alone at least 3 times.

The third session

This session was conducted in the real road. The subjects were divided into 14 groups. Each group had applied what they were taught in the first and second session.

Phase (5) Evaluation of educational program

Immediately and after three months from implementation of the educational program reassessment of subjects was done as pretest assessment.

Ethical Consideration

The research proposal was approved from ethical committee of the faculty of nursing; confidentiality and privacy of the study were asserted. A written consent was taken from the deaf children's parents. Clarification of the nature and the aim of the study were done in initial interview with each deaf child by the help of teachers, with an emphasis that the study yields no harm to the subjects. The subjects had the right to refuse to participate in the study without any rational.

Statistical Design

The Statistical package for social sciences (SPSS) software (Version 16) was used for analysis. The categorical data such as age, gender, the age at which deafness began family history, birth order, academic achievement, and child residence, degree of deaf and used of amplification are presented as frequency and percentage.

Paired t-test was used to compare the pre and post means of knowledge and practice items. Statistical significance was accepted at the 95% confidence level ($p < 0.05$). Chi-square test was used to compare the categorical data of levels of knowledge and practice.

Limitations of the study

1. Transportation was a problem because the researcher must have to travel to another governorate to collect data from the selected setting.
2. Lack of references related to this thesis.

Results

The results of the current study were presented in three parts:

Part One: This part concerned with personal characteristics and hearing data of the studied deaf children. Tables (1, 2)

Part Two: knowledge of studied deaf children about protection from car accidents. Tables (3, 4)

Part Three: Practice of studied deaf children about protection from car accidents. Tables (5-9)

Part one: Personal characteristics of the studied deaf children

Table 1: Personal characteristics of studied deaf children.

Personal characteristics	Deaf children	
	Total (N.)=69	
	N.	%
Age stage		
School	25	36.2
Adolescent	44	63.8
Sex		
Male	36	52.2
Female	33	47.8
Birth order		
1 st	17	24.6
2 nd	12	17.5
3 rd	17	24.6
4 th	23	33.3
Academic achievement		
Excellent	17	24.6
Very good	18	26.1
Good	28	40.6
Pass	6	8.7
Child Residence		
Dormitories at school	63	91.3
With the family	6	8.7

This table showed that; about two-thirds of studies children were adolescents (64%). Near half of them were male. Third birth order was represented by one third of the sample. Their

academic achievement was good in 41% of the sample. The majority of the subjects lived in dormitories at school (91%).

Table 2: Characteristics of hearing impairment of studied deaf children.

Characteristics of hearing impairment	Deaf children	
	Total (N.)=69	
	N.	%
The age at which deafness began		
At birth	55	79.7
School	14	20.3
Family history		

Positive	48	69.6
Negative	21	30.4
Degree of hearing impairment		
Slight impairment	4	5.8
Moderate impairment	19	27.5
Severe impairment	28	40.6
Profound impairment	18	26.1
Usage of amplification		
Hearing aid	28	40.6
Cochlear implant	22	31.9
None	19	27.5

This table showed that; the majority of the subjects began deafness at birth (79.7%). About two-thirds the most of subjects had positive family history (69.6).sever and

profound impairment were found in 40.6% and 26.1% respectively. Less than a half (40.6%) used hearing aid and third of them had cochlear implant.

Part two: knowledge of studied deaf children about protection from car accidents

Table 3: The mean knowledge score of deaf children about protection from car accidents before and after educational program.

Knowledge about protection from car accident	Pre - test	Post - test	P- value
	Mean ±SD	Mean ±SD	
Definition of injuries	1.46±0.50	1.60±1.50	0.0001*
Define car accident	1.347±2.30	1.50±1.275	0.0001*
Causes of car accident	4.17±1.56	6.52±2.31	0.0001*
Light signal	1.52±1.51	2.95±.361	0.0001*
Pedestrian light sign	1.17±1.47	2.95±0.36	0.0001*
Traffic cop	1.43±1.50	2.95±0.36	0.0001*
Sidewalk	1.17±1.47	2.86 ±0.616	0.0001*
Pedestrian walkway	1.13±1.46	2.73 ± 0.85	0.0001*
Footbridge	1.04±1.43	2.86 ± 0.616	0.0001*
Pedestrian tunnel	1.17±1.47	2.82 ±0.706	0.0001*
Signal stopped	0.86±1.37	2.86±0.616	0.0001*
Turn right	0.913±1.39	2.56±1.063	0.0001*
Turn left	0.869±1.371	2.347±1.246	0.0001*
Run over	0.869 ± 1.371	2.608±1.017	0.0001*
Street parts	1.637±0.685	3.68±0.757	0.0001*
Safe transit places	2.246±0.945	4.97±1.49	0.0001*
Risk transit places	1.695±0.523	3.637±0.766	0.0001*
Places to play	1.66±0.7001	3.78±0.763	0.0001*

Paired samples T test was used & significant difference $P < 0.05$.

This table demonstrates that; there was highly statistically significant difference between deaf children knowledge about car accidents before and after the educational

regarding all items of protection from car accidents (p-value = 0.0001).

Table 4: level of studied deaf children's knowledge about car accident's before and after educational program.

Score of knowledge	Pre - test		Post - test		P-value
	N.	%	N.	%	
Satisfactory	20	29	66	95.7	0.0001*
Unsatisfactory	49	71	3	4.3	
M±SD	26.55±16.95		57.11±8.18		

M±SD = mean ± standard deviation, Paired samples T test was used & significant difference $P < 0.05$.

This table illustrated level of studied deaf children's knowledge about car accident's before and after educational program. There was high statistically significant difference between pre and post -test (p-value = 0.0001); the majority

in pre educational program had unsatisfactory knowledge (70%) while the majority in post educational program had satisfactory knowledge (94%) with 26.55±16.95, 57.11±8.18 respectively.

Part three: Practice of studied deaf children about protection from car accidents

Table 5: Mean scores of deaf child practice about rules and etiquette of walking on the sidewalk before and after educational program

practice about rules and etiquette of walking on the sidewalk	Pre – test	Post - test	P- value
	Mean ±SD	Mean ±SD	
Walking on the pavement and not using the sidewalk for sitting or playing.	1.159 ± 0.994	1.82 ± 0.567	0.0001*
Distance from the street as much as possible and commitment to the right when	1.246±.976	1.749±.899	0.011*

walking on the sidewalk.			
Walking with a friend and not walking in groups.	0.840±0.994	1.594±.810	0.0001*
Wear light-colored clothing especially in the evening.	1.246±.976	1.826±.576	0.0001*
In the absence of a sidewalk, the walking must be reversed with car direction and in the far end of the road.	0.811±.989	1.536±.850	0.0001*
Avoid obstacles and trees on the pavement and do not throw dirt or waste on it.	1.202±.978	1.536±850	0.024*

Paired samples T test was used & significant difference $P < 0.05$.

The table showed that; there was significant difference between pre and posttest mean scores of deaf child practice about rules and etiquette of walking on the sidewalk before and after educational program (p -value>0.05).

Table 6: Mean scores of deaf children practice about rules of safe passage for roads before and after educational program

Practice about rules of safe passage for roads	Pre – test	Post - test	P-value
	Mean ±SD	Mean ±SD	
Stand on the edge of the road	1.130±.998	1.710±.709	0.0001*
Look left	1.159±.994	1.884±.470	0.0001*
Look right	1.014±1.007	1.913±0.410	0.0001*
Look left again to make sure the road is free of cars	0.811±0.844	1.565±0.830	0.0001*
Crossing the street in a straight line and with caution and attention	0.782±0.983	1.710±0.709	0.0001*

Paired samples T test was used & significant difference $P < 0.05$.

The table showed that; there was significant difference between pre and posttest related to the mean scores of deaf child practice about rules of safe passage for roads (p -value=0.0001).

Table 7: Mean practice scores of deaf children about etiquette of riding cars before and after educational program

Practice about etiquette of riding cars	Pre - test	Post - test	P-value
	Mean ±SD	Mean ±SD	
Standing regularly on the pavement before boarding.	0.695±0.959	1.623±0.787	0.0001*
Waiting for the parking of the car to stand completely	1.159±0.994	1.652±0.763	0.002*
Ascend from the right side adjacent to the pier	0.579±0.914	1.507±0.868	0.0001*
Get off the side of the pier.	0.492±0.868	1.855±0.522	0.0001*
Sit in the back seats.	0.492±0.868	1.362±0.938	0.0001*
Use seat belt.	0.637±0.938	1.507±0.868	0.0001*
Do not remove the head or hands from the window.	0.840±0.994	1.275±0.968	0.0001*
Keep calm and not talk to the driver.	0.579±0.914	1.797±0.608	0.0001*

Paired samples T test was used & significant difference $P < 0.05$.

The table showed that; there was significant difference between pre and posttest related to the mean scores of deaf child practice about etiquette of riding cars (p -value=0.0001).

Table 8: Mean scores of deaf children practice about ways to avoid accidents run over before and after educational program

Practice about ways to avoid accidents run over	Pre – test	Post - test	P-value
	Mean ±SD	Mean ±SD	
Adhering to the rules and etiquette of walking on the pavement.	0.637±0.938	1.884±0.470	0.000*
Use of safe places designated for pedestrian crossing.	1.072±1.004	1.652±0.763	0.001*
Avoid crossing the road from dangerous places.	0.753±0.976	1.623±0.787	0.000*
Use secure transit rules for the road	0.492±0.868	1.739±0.678	0.000*
Commitment to the ethics of riding cars.	0.927±1.004	1.710±0.709	0.000*
Obligation to play places.	0.956±1.006	1.536±0.850	0.000*

Paired samples T test was used & significant difference $P < 0.05$.

The table showed that; there was significant difference between pre and posttest mean scores of deaf child practice about ways to avoid accidents run over (p -value<0.001).

Table 9: Level of deaf children practice before and after educational program

Score of practice	Pre – test		Post – test		p-value
	N.	%	N.	%	
Satisfactory	24	34.8	64	92.8	0.0001*
Unsatisfactory	45	65.2	5	7.2	
M±SD	21.72±6.19		41.27±10.5		

Paired samples T test was used & significant difference $p < 0.05$.

This table illustrated level of studied deaf children's practice about car accidents before and after educational program.

There was high statistically significant difference between pre and post; the majority in pre educational program had unsatisfactory practice (65%) while the majority of them in post educational program had satisfactory (93%) with total mean practice score 21.72 ± 6.19 and 41.275 ± 10.5 respectively.

Discussion

Hearing is the ability to perceive sound. A person experiencing hearing hindrance experiences issues in perceiving or distinguishing sound clearly due to auditory problems. Impairment could be unilateral or bilateral. (Dankbaar & Van Zanten, 2008) [7].

The aim of this study was to determine the impact of an educational program on the knowledge and practice of deaf children regarding protection from car accidents.

The findings confirm the beneficial effects of the interventional educational program about protection from car accidents as they promoted significant positive change in all outcomes. The program activities in this study incorporated increasing knowledge and practice for the studied deaf children regarding protection from car accidents.

Concerning the studied children's age, it was found that the high incidence of deaf children aged between 12- 18 years. This finding disagrees with the results of (Tobergte & Curtis, 2013) [21] who found that one third of hearing loss children aged between 5-10 years within school age, and also with (Gheysen & Waelvelde, 2007) [10] who investigated the impact of a cochlear implant (CI) on the motor development of deaf children as the studied deaf children aged from 2 - 9 years. (Abdelghaffar & Elshazly, 2011) [1] Applied their project on 45 children (21 males and 24 females) between 5 and 6 years of age too.

As for the studied deaf children gender, in the present study results showed that males are more affected with hearing disorder compared to females. This finding is in agreement with a study carried out by (Tobergte & Curtis, 2013) [21] who found a higher prevalence of hearing disorder in males than in females. But this result disagrees with the results of a study carried out by (Ahmed & Tsigahmed, 2015) [2] who studied 58 patients with hearing disorder and found that hearing disorder was more prevalent in females as compared to males.

According to Dankbaar & Van Zanten, 2008 [7] the academic performance was affected due to difficulty in receiving the correct messages. If a child does not hear the teacher well, she may not follow instructions well, and be considered either a 'behavior problem' or a withdrawn student.

This finding was in concurrence with the present study regarding academic achievement of studied deaf children were good (40.6%). This finding also disagreed with the finding of the study carried out by Andrews *et al.*, (2017) [3] in hearing loss and its implications for learning and communication which illustrated that children may have; lower scores on achievement and verbal IQ tests, poor reading and spelling performance, greater need for enrollment in special education or support classes, and lower performance on measures of social maturity.

The results of the present study showed that the majority, of the studied deaf children had settled in dormitories at

school. This finding disagree with (Hassan and Abd-Elraouf, (2010) [12] who found that the studied deaf children had lived with their families. This may be due to in sample characteristics and disease severity in that study.

Regarding the age at which deafness began, 3/4 of the studied deaf children had hearing loss at birth. This agree with the findings of academic and social adjustment among deaf and hard of hearing college students in Taiwan by Roberts *et al.*, 2013 who found that more than one third of hearing loss onset of studied deaf children started at birth, also this finding is consistent with result of Tobergte & Curtis, 2013 [21] who found that more than half of the studied deaf children were diagnosed as hearing loss onset at birth.

On the other hand, results of this study emphasized that severe impairment was the most degree of hearing impairment in studied deaf children. This finding agrees with the results of Bishop, (2014) [4] whose results revealed that the degree of deafness was severe hearing impairment. But (Roberts *et al.*, 2013) disagree with the finding of the present study, as more than half studied deaf children had profound impairment.

As regard using amplification in children with hearing impairment, the results of the present study indicated that more than one third of deaf children used hearing aids. This finding agrees with the results of the study carried out by (Roberts *et al.*, 2013) who found that there was a raised incidence of hearing aids used in children with hearing impairment.

According to the present study results, there was highly statistically significant difference between deaf children knowledge about car accidents before and after the educational program. The majority in pre educational program had unsatisfactory knowledge while the majority in post educational program had satisfactory knowledge.

These finding might be related to different instructional methods used by researcher and teachers such as pictures, lectures and group discussion which played main role in improvement of deaf children knowledge. Good communication between the deaf children and teaching team and finally the desire of deaf children of deaf children to learn how to protect him from car accident.

DaCoTa (2013) [6] found that the children who have disability and psychomotor skills deficiency are increasingly risked to traffic crashes.

Based on the result of current study, there was significant difference between pre and posttest related to the mean scores of deaf child practice about rules and etiquette of walking on the sidewalk before and after educational program (p-value<0.05)

Based on the result of current study, there was significant difference between pre and posttest related to the mean scores of deaf child practice about rules of safe passage for roads (p-value=0.0001).

The present study also found a significant difference between pre and posttest related to the mean scores of deaf child practice about etiquette of riding cars (p-value=0.0001).

Based on the result of current study, there was significant difference between pre and posttest related to the mean scores of deaf child practice about ways to avoid accidents run over (p-value<0.001).

There was high statistically significant difference between pre and post; the majority in pre educational program had unsatisfactory practice while the majority in post educational program had satisfactory practice. This result is in accordance with that of Taylor *et al.*, (2017) [18] who found a positive effect of interventional educational program on children's road safety behavior

Conclusion

Based on the results of the current study, it can be concluded that the educational program had a great effect on improving deaf children's knowledge and practice regarding car accidents.

The studied deaf children' demographic characteristics (age, gender, degree of deaf and used amplification) not affected on their knowledge and practice during applied educational program about protection from car accidents.

The age at which deafness began, degree of deafness were not affecting on studied deaf children academic achievement.

There were statistically significant differences between pre and post the educational program as the deaf children who received the educational program had improvement in knowledge program had improvement in knowledge and practice about car accident.

Recommendations

Based on the results of this study, the following recommendations are suggested:

1. Health education of family in rural areas through charities about deafness and types of disability.
2. Apply follow up on studied deaf children in the Holy land institute for the deaf about protection from car accidents.
3. Apply similar education program in all private and governmental schools at Jordan to increase knowing about protect of deaf child from car accident.
4. Prepare educational program of staff and students in Egypt schools according to curriculum of ministry of education Future researches should be done on large sample of children in different settings focusing on the outcome of children.
5. In-service training programs should be provided to increase knowledge and skills for teachers about car accident to reduce incidence of accidents among deaf children.

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