

Effect of Healthy Strategies on Parents' Awareness regarding Preventing and Controlling Complications of Testicular Torsion in their Children

⁽¹⁾Sahar Sedky Faheim, ⁽²⁾Doaa Bahig Anwr , ⁽³⁾Hala Samir Ahmed, ⁽⁴⁾Asmaa Awad Helmy, ⁽⁵⁾Donia Elsaid Fathi Zaghmir.

(1) Assistant Professor of Pediatric Nursing, Faculty of Nursing, Beni-Suef University, Egypt.

(2) Lecture of Pediatric Nursing ,Faculty of Nursing, Aswan University, Egypt.

(3) Lecturer of Pediatric Nursing, Faculty of Nursing – Damietta University. Egypt.

(4) Lecturer of Pediatric Nursing, Faculty of Nursing - Helwan University. Egypt.

(5) Lecture of pediatric Nursing ,Faculty of nursing, Port Said university, Egypt.

Abstract

Background: Children who experience testicular torsion suffer a great deal of morbidity, but it is difficult to estimate the social costs that established the risk factors for testicular loss. **The aim of study was** to evaluate the effect of healthy strategies on parents' awareness regarding preventing and controlling complications of testicular torsion in their children. **Design of the study:** A quasi-experimental approach was utilized. **Sample:** A convenience sample of 100 parents and their children with testicular torsion was used. **Setting:** Pediatric urology departments and outpatient clinics of general hospitals in Port Said City as well as Al-Azhar Hospital University in Damietta City. **Tools:** Three tools were utilized in this study. **Tool I:** A Structured Interviewing Questionnaire **Part A:** Children's characteristics **Part B:** Parents' characteristics **Part C:** Parents' knowledge **Tool II:** Parents' reported practices. **Tool III:** Parents' attitude **Results:** There is a significant relationship between parents' age and educational level, knowledge, practice scores, and follow-up data on the phases of implementing healthy strategies. The majority of parents studied had a positive attitude towards preventing and controlling complications of testicular torsion. **Conclusion:** Post-implementation of the healthy strategies, there were improvements in parents' awareness regarding preventing and controlling complications of testicular torsion. **Recommendation:** It is recommended that the study should be repeated in additional organizations with a significant number of participants in order to generalize its findings and clinically confirm the effectiveness of the application of healthy strategies.

Keywords: Healthy strategies, Parents' Awareness, Preventing and Controlling Complications, Testicular Torsion

Introduction

Testicular torsion (TT) is the longitudinal rotation of the spermatic cord, can cause problems with the blood arteries that supply the testicles, the degree of damage, changed hormone production, the potential functional loss of a testicle, and infertility are all strongly correlated with the severity of blood flow restriction. As a result, there occurs ischemia, which quickly progresses to organ death (*Shunmugam & Goldman, 2021*). Abrupt complications, ongoing unilateral scrotal soreness, nausea, and vomiting are common signs of torsion. Untwisting the testis requires urgent surgery. There is a 9% chance of testicular loss if surgery is done within six hours of when pain first appears (*Lacy et al., 2023*).

Testicular torsion (TT) is the most frequent pediatric urological and requires immediate attention. The spermatic cord is longitudinally twisted, which decreases blood supply to the testis

and results in ischemia of the scrotal tissue. The production of hormones may be affected, which may eventually compromise fertility and, in situations of late presentation, lead to orchiectomy (*Shunmugam & Goldman, 2021*). The prevalence of testicular torsion (TT), which peaks in early adolescence and the first year of life, was reported to be 3.8 per 100,000 boys under the age of 18. (*Sugrue et al., 2022*). Children under the age of 18 are thought to experience testicular torsion about 0.004% of the time each year . A large number of cases occur after the age of 10, peaking between the ages of 12 and 16, even though it can occur at any age (*Ferreira & Catunda, 2022*).

A common medical condition affecting young males between the ages of 10 and 18 is testicular torsion. Youngsters have testicular loss at higher rates than adults do because youngsters take longer to visit the hospital after experiencing severe testicular pain. (*MacDonald et al., 2018*).

Both intravaginal and extravaginal testicular torsion are possible; extravaginal torsion occurs more frequently in babies, while the majority of TT cases are caused by intravaginal torsion, which primarily affects pubertal boys (*Jacobsen et al., 2020*).

Males should have TT tested in their scrotums. Physical examination may show a testicle that is high-riding with no cremasteric reaction if the patient complains of scrotal or lower abdominal pain, scrotal swelling, nausea, or vomiting. The patient's recovery depends on quick identification and treatment when clinical investigations reveal or suggest spermatic cord torsion. Children and teenagers should still receive surgical exploration if they have had acute scrotal pain for at least 12 hours because it is difficult to determine if the testis will survive. (*Jacobsen et al., 2019*). The loss of the testis, which can affect fertility and prolong treatment at the referral hospital, is the most serious side effect of testicular torsion. Testicular torsion's prognosis is based on when the patient presents to the emergency room (ED), as well as when the diagnosis is made and treatment is started (*Alyami et al., 2019*).

Effective behavioral modification intervention methods must be developed the rates of testicular loss in teenagers need to be reduced. Interventions with a theoretical foundation grounded on evidence have been found to be more successful than those without (*MacDonald et al., 2022*). Nurses play a crucial role in teams that direct parents to early preventative, early diagnostic, early therapeutic, and early supportive services for kids at work, school, and medical facilities. The nurse's job involves educating, directing, teaching, and listening to both parents and medical professionals. Guidance, evaluating parental attitudes, practice, and knowledge of care and examinations should all be part of good solutions (*Slobodin and Davidovitch 2019*).

The Significance of the Study

One of the most frequent crises in pediatric urology is testicular torsion. Early detection, action, and preservation of the affected testicle may result from family members being aware of this problem. In teenagers and young men, testicular torsion continues to be the predominant factor contributing to testicular ischemia and

organ loss. The likelihood of consequences including ischemia, necrosis, sepsis, and even infertility, however, might significantly increase if medical assistance is not sought right away (*Yilmaz et al., 2022*).

Relevant studies showed that 12–68% of these patients developed testicular atrophy (TA) even after a successful orchiopexy. To prevent the permanent loss of the testis, TT must be detected as soon as possible for early surgical surgery within 4–8 hours; After this period, the child's fertility will decline and orchiectomy rates will rise. 42% of boys with TT who presented late reportedly underwent orchiectomy (*Alyami et al., 2019*). Testicular torsion must be identified immediately and medically treated within 4–8 hours. Parents must be informed of the serious and permanent consequences of orchiectomy for males. Early nurse and urgent nursing intervention should be included in order to educate the parents on possible treatment options for their children who exhibit troublesome behaviors (*Kidd et al., 2023*). Therefore, this study was carried out to evaluate the effectiveness of healthy strategies on parents' awareness regarding preventing and Controlling Complications of testicular torsion in their Children.

Aim of the study

This study was conducted to evaluate the effectiveness of healthy strategies on parents' awareness regarding preventing and controlling complications of testicular torsion in their children, through:

- Assessing parents' knowledge, attitudes and practices regarding preventing and controlling complications of testicular torsion in their children.
- Design and implementation of healthy strategies for parents to preventing and controlling complications of testicular torsion in their children.
- Evaluating modifications to parents' knowledge, practices, and attitudes regarding preventing and controlling complications of testicular torsion in their children.

Research Hypothesis:

- After implementing the recommended healthy strategies regarding parents'

knowledge regarding preventing and controlling testicular torsion. Complications among their children would be significantly greater than it was before.

- After the implementing of healthy strategies regarding preventing and controlling complications of testicular torsion in their children, the parents' practices would be significantly improvement compared to previously.
- After the implementing of healthy strategies regarding preventing and controlling complications of testicular torsion in their children, the parents' attitudes would be significantly improvement compared to previously.

Subjects and Methods

Design of research:

This study used a quasi-experimental design. It was used to one study group that evaluated pre, immediately, and follow up the Implementation of healthy strategies impacted issues .

Setting:

The study carried out in Pediatric Urology Departments and Outpatient Clinics of General Hospitals in Port Said City as well as Al-Azhar Hospital University in Damietta City.

Subject:

All available parents (100) and their children with testicular torsion were eligible to participate in the study and had never before attended programs regarding testicular torsion.

Tools: There were three Tools for Data Collection:

Tool I: A structured interviewing questionnaire: Adopted from (*Alyami et al., 2019; MacDonald CM et al., 2022; Hallows et al., 2022*). It was divided into three Parts, as follows:

Part A: Children's characteristics such as; age, sex, education, birth order, and duration of the problem.

Part B: Parents' characteristics, including age, sex, education, occupation, and testicular torsion history in the family, as well as

sources of knowledge and with whom the child feels most comfortable.

Part C: Parental assessment of knowledge (before, post, and follow-up): The main concepts of testicular torsions, such as its description, incidence, types, causes, signs and symptoms, diagnostic tests, when to call a doctor, complications, and surgical, medical, and nursing care methods, were assessed using this tool to determine how well-informed parents were about testicular torsion in their children.

Scoring system:

There were 14 questions in this section, totaling 42. Three score levels were assigned to each question: Complete and right answers received a score of 3. While incomplete answers received a score 2, don't know or incorrect answers received a score of 1

The total knowledge score was categorized into 3 levels as the following:

- Good: ($\geq 60\%$.)
- Average: ($50 < 60\%$).
- Poor: ($< 50\%$)

Tool II. A pre/post and follow-up Checklist for Parents' reported Practices. derived from; (*Saleem et al., 2017*) and (*Guo et al., 2019*):

This tool was included practical steps related to testicular torsion, by assisting the researchers in evaluating parents' practices for children with testicular torsion, including; Physical examination (testicular self-examination) was 7 steps. TWIST (Testicular Work-up for Ischemia and Suspected Torsion) was 7 steps. Nausea/vomiting relief was 10 steps. Pain relieving was 8 steps. Wound care was 10 steps. Personnel hygiene and hand washing was 8 steps. Observing urine output and character of testis was 5 steps. Observing signs of infection was 6 steps. Follow up program was 5 steps.

Scoring system:

This part consisted of 66 steps with total score (132). Each step received a score level: done was assigned a score of (2), and not done received a score of (1).

The entire practice score was divided into two levels as the following:

- Satisfactory: ($\geq 70\%$)
- Unsatisfactory: ($<70\%$)

The Alpha Cronbach reliability test result for the checklist was 0.87.

Tool III: Parental attitudes (likert scale):

Adapted from (Suen *et al.*, 2006) it was used to assess parents attitudes regarding testicular torsion such as; hospital immediately have a role in decreasing testicular torsion complication, documentation of testicular torsion in Egypt is high, Testicular torsion can be treated with homeopathy, medicines can contribute to testicular torsion development, testicular torsion can affect fertility, and media can raise public awareness of testicular torsion.

Scoring system:

The Likert scale has ten assertions with a total value of 30. Each statement was assigned to three score level: score (3) for agree, score (2) for neutral and score (1) for disagree. The total attitude score was categorized into 3 levels as the following:

- Positive: ($\geq 80\%$)
- Indifferent: ($60 < 80\%$)
- Negative: ($< 60\%$).

Validity of Tools:

Five experts (3 from pediatric nursing and 2 from pediatric medicine) reviewed the tools for clarity, relevance, comprehensiveness, understanding, and applicability, and only minor changes were made.

Tool Reliability:

Cronbach's alpha was utilized to evaluate the tools.

Ethical Consideration:

The Port Said University Faculty of Nursing's Scientific Research Ethical Committee gave the study the thumbs up. Parents were told about the study's objective, aim, and anticipated results prior to the data collection, and their informed consent was acquired. Parents were informed by the researchers that there were no risks associated with the study, that participation was fully voluntary, and that they had the right to withdraw from it at any time and for any reason. Because it will only be used for study, the collected data will

be kept anonymous. Ethics, values, culture, and religious views were all upheld.

Operational design:

Preparatory phase:

In order to develop data-Collecting procedures, it was necessary to examine pertinent literature and get a theoretical understanding of various study-related topics using books, papers, the internet, and periodicals.

Pilot study:

In order to test and assess the usefulness, clarity, and application of the study tools as well as the time needed to complete each one, a pilot study including 10% of the study participants—10 parents and their kids - was conducted. The research pilot sample was not left out of the main study sample because there were no adjustments.

Field work:

Beginning at the beginning of November 2022 and concluding at the end of April 2023, the study lasted six months. Three days a week, from 9:00 a.m. to 1:00 p.m., the researchers went to the aforementioned locations: Saturdays, Mondays, and Wednesdays. The study's goals and objectives were explained to the participants in each study environment. The Likert scale for the structured interview questions took an average of 20 minutes to complete. The observational checklists (reported practices) took an average of 40 minutes to complete, whereas the evaluation took an average of 10 minutes. The researchers are developing methods for acquiring information based on analyses of pertinent historical and modern literature that examine various aspects of testicular torsion using books, periodical articles, and journals that are that are currently available.

The healthy strategies conducted into four phases:

- ✓ This program was carried out in four stages: assessment, planning and implementation, evaluation, and a follow-up phase after two months.
- ✓ Healthy strategies aimed to improve parents' knowledge, practices and attitude about testicular torsion, this aim explained to all participants.

First Phase: Assessment or pre-test of the parents' knowledge, practices, and attitudes towards preventing and controlling complications of testicular torsion in their children to evaluate their requirements.

Second Phase: Planning and implementation, which includes establishing and deciding on healthy strategies for carrying out the study and achieving the goal.

- On the basis of the pre-test results, healthy coping mechanisms were created. Healthy techniques were devised and implemented on the study population (parents and their children). The study sample of 100 parents was divided into ten groups, each with ten parents. The healthy strategies that applied on studied parents contended throughout two sessions (theoretical and practical).
- The following topics were discussed in the theoretical session: definition, incidence, types, causes, signs and symptoms, diagnostic tests, when to call a doctor, surgical therapy, medical treatment and nursing care, complications, effort or strategy to prevent complications of testicular torsion.
- Study lectures, group discussion, and brain storming were employed as teaching approaches. Picture and pamphlets were also used as media. The parents were given a leaflet. This session take 30 - 40 minutes appropriate to the parents ' needs and conditions of the group.
- The following were covered at the practical session: Physical examination (testicular self-examination), TWIST score (Testicular Work-up for Ischemia and Suspected Torsion), nausea/vomiting relief, pain relief (headache, abdomen, and testis), child hygiene and hand washing, wound care, observing urine output, observing signs of infection, and follow-up.
- For the practical session, teaching approaches included demonstration and re-demonstration, role play, simulator, real objects, debates, and brainstorming. The researchers used successful information-delivery methods such as power point presentations and posters. Depending on the needs of the parents and the group's state, this session lasts between 35 and 45 minutes.

- All of these healthy strategies were implemented during the previously described settings.

Third Phase: The evaluation was carried out by employing data analysis tools to analyze parents' knowledge, practices, and attitudes immediately following the adoption of the healthy strategies.

Fourth Phase: After two months, the researchers used data assessment tools to compare improvements in parents' knowledge, practices, and attitudes towards healthy techniques for preventing or controlling complications of testicular torsion in their children.

Administrative design:

For this study, an authorized consent letter was acquired from the Dean of the Faculty of Nursing at Port Said University. The study was approved by the directors of General Hospitals in Port Said City and Alazhar University Hospital in Damietta City, as well as the chief nurse of the Pediatric Urology Departments and Outpatient Clinic. The study's title, goal, and predicted outcome have all been depicted.

Statistical design:

The data was collected, scored, tabulated, and analyzed on a personal computer using the Statistical Package for the Social Sciences (SPSS) version 26 programs. Data were supplied in the form of frequencies and percentages using descriptive statistics. The Chi-square test (X^2) was used for qualitative variable comparisons.

- Non-statistically insignificant ($p > 0.05$).
- Statistically insignificant ($p < 0.05$)
- Highly statistical significant correlation ($P < 0.001$).

Results

Table (1) revealed that 45% of the children studied were aged 12 to 18, with a mean age of 12.85 ± 1.46 years. Regarding, testicular torsion side, 76% were on the right side. In terms of blood flow on ultrasonography, 85% of them were reduced, and the duration of symptoms for 40% of them was between 8 and 50 hours.

Figure (1) indicated that the most common risk factors and causes of testicular torsion in children were greater mobility of the testis and

spermatic cord (65%), trauma (15%), and infection (10%).

Table (2) presented the characteristics of the studied parents. It showed that their ages ranged from more than 30 years to 28.62 ± 4.22 years. As regarding to their education, less than half (44%) of the parents had completed secondary school. According to parental residency, this table revealed that 60% of them live in rural areas. While 70% of parents worked, regarding to their occupation. In terms of child comfort, more than half (56%) of children felt at ease with their fathers, and 82% of surveyed parents were testicular torsion.

Table (3) showed that following the immediate and continued adoption of healthy behaviors, there are highly statistically significant variations in parents' perceptions of testicular torsion in their children.

Figure (2) described the studied parents' total knowledge score. The majority of them (70%) had inadequate knowledge prior to the implementation of healthy strategies, which increased to good knowledge for the majority of them (90%), immediately after the implementation of healthy strategies. However, a highly statistically significant difference (P.0001), a majority of studied parents (80%) had good total knowledge scores in the follow-up phase of healthy strategies implementation.

Table (4): pointed that there are highly statistically significant improvements in parents' practice post- immediately and follow-up application of healthy strategies for testicular torsion in their children.

Figure (3) illustrated the total practices, the majority of the studied parents (85%) had unsatisfactory practices before to the implementation of healthy strategies, which improved for the majority of them (90%) to have satisfactory practices immediately after the implementation of healthy strategies. Furthermore, the same figure demonstrates that, with a highly statistically significant difference (P.0001), the majority of the studied parents (88%) had satisfactory level in their overall scores of practices in the follow-up phase of healthy strategies implementation.

Table (5) showed that, after, and at follow up healthy strategies implementation, There is an immediate improvement in the parents' total attitude, the majority of them, (85% , 82%) of studied parents showed positive attitude toward preventing and controlling complications of testicular torsion, while, for the majority (80%) of them was negatively associated pre healthy strategies implementation. Furthermore, this table indicated that there is a highly statistically significant difference (P 0.001) of parents' total attitude immediately after, and at follow-up of healthy strategy implementation.

The data in Table (6) showed a statistically significant positive link between parents' knowledge level, age, and educational attainment before and after the adoption of healthy behaviors (P 0.001). However, this table demonstrated statistically insignificant associations between parents' overall practice and their ages and educational levels prior to, immediately following, and following the implementation of healthy methods.

Table (1): Characteristics of the Studied children with Testicular Torsion (n=100)

Characteristics	No	%
Age(years) at the time of surgery		
< 6	15	15.0
6 -12	30	30.0
12 ≤ 18	55	55.0
Mean ±SD	12.85±1.46	
Affected Side		
Right	76	76.0
Left	24	24.0
Blood flow on ultrasonography		
Decreased	85	85.0
Absent	15	15.0
Duration of symptoms		
<8 hrs	35	35.0
8-50 hrs	40	40.0
>50 hrs	25	25.0

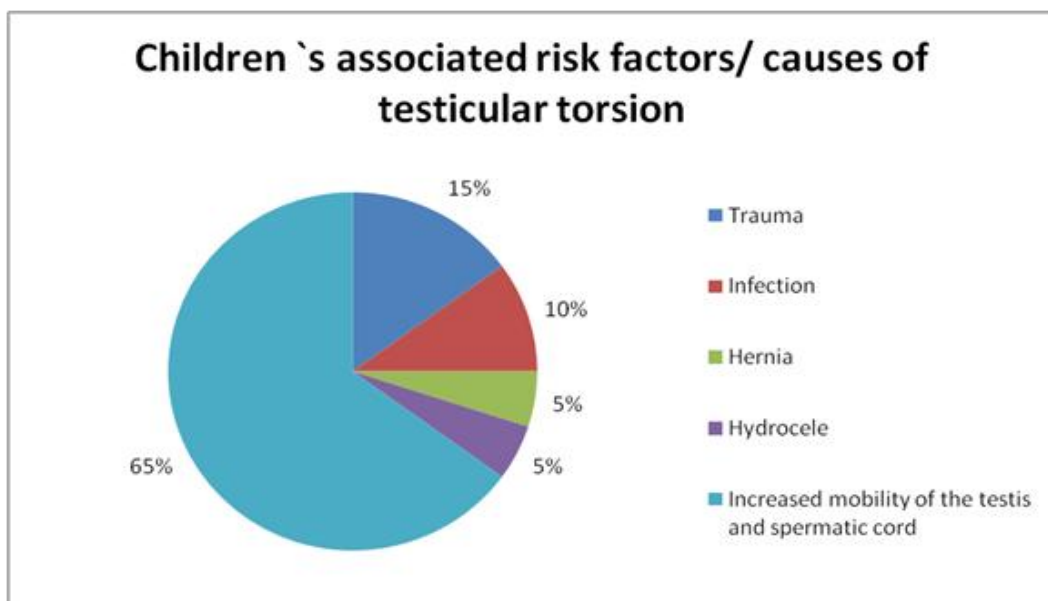


Fig (1): Distribution of Children ' Risk Factors /Causes of Testicular Torsion (n=100)

Table (2): Characteristics of the Studied Parents of Children with Testicular Torsion (n=100)

Characteristics	No	%
Age/years		
< 20	12	12.0
20 < 25	30	30.0
25 < 30	25	25.0
≥ 30	33	33.0
Mean ±SD	28.62 ± 4.22	
Healthy level		
Illiterate & primary	35	35.0
Secondary Education	44	44.0
Higher Education	21	21.0
Residence		
Urban	40	40.0
Rural	60	60.0
Parents' occupation		
Working	70	70.0
Not working	30	30.0
With whom the child is more comfortable		
Father	56	56.0
Mother	44	44.0
The information about testicular torsion?		
Yes I have	18	18.0
No I haven't	82	82.0

Table (3): Percentage Distribution of the Studied Parent's Knowledge regarding Testicular Torsion throughout the Healthy Strategies Phases (n = 100).

Knowledge related to Testicular Torsion	Pre- Healthy Strategies			Post- Healthy Strategies			Follow up		
	Wrong Answer	Incomplete Answer	Correct Answer	Wrong Answer	Incomplete Answer	Correct Answer	Wrong Answer	Incomplete Answer	Correct Answer
	%	%	%	%	%	%	%	%	%
Definition of testis	5.0	35.0	60.0	0.0	6.0	94.0	0.0	7.0	93.0
Description of testicular torsion	15.0	40.0	45.0	0.0	5.0	95.0	0.0	6.0	94.0
Definition of testicular torsion	55.0	30.0	15.0	0.0	10.0	90.0	0.0	12.0	88.0
Types	65.0	35.0	0.0	5.0	12.0	83.0	6.0	10.0	84.0
Causes	75.0	20.0	5.0	5.0	10.0	85.0	6.0	8.0	86.0
Clinical manifestation	25.0	35.0	40.0	0.0	7.0	93.0	0.0	10.0	90.0
Diagnostic tests	45.0	40.0	15.0	0.0	7.0	93.0	0.0	10.0	90.0
Surgical treatment	53.0	32.0	15.0	0.0	9.0	91.0	0.0	13.0	87.0
Medical treatment	62.0	38.0	0.0	5.0	11.0	84.0	5.0	10.0	85.0
Preventing methods	70.0	20.0	10.0	4.0	12.0	84.0	7.0	9.0	84.0
Complications	62.0	38.0	0.0	5.0	11.0	84.0	5.0	10.0	85.0
Nursing care	53.0	32.0	15.0	0.0	9.0	91.0	0.0	13.0	87.0
T-test P value	$X^2 = 16.8$ pre versus post-healthy strategies								P value <0.001**
	$X^2 = 20.9$ pre -healthy strategies versus follow -up								
	$X^2 = 12.4$ post -healthy strategies versus follow -up								

** Highly statistically significant P <0.001

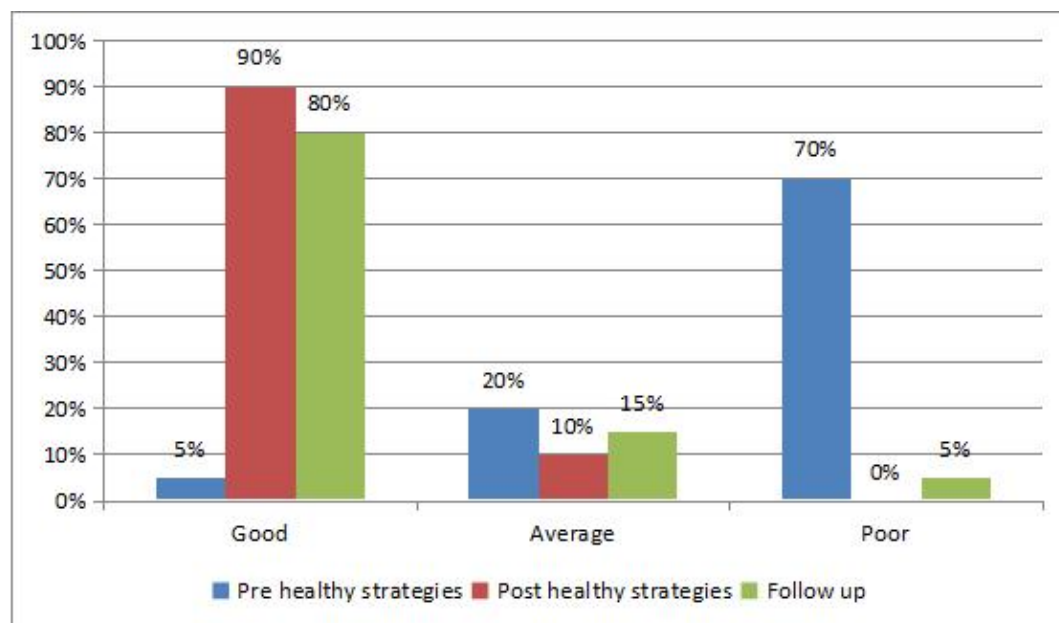


Figure (2): The Distribution of Total Parental Knowledge regarding Testicular Torsion during Healthy Strategies Phases Phases(n = 100).

Table (4): The Distribution of Parental Reported Practices regarding Testicular Torsion during Healthy Strategies Phases (n = 100).

Practice related to testicular torsion-in children	Pre-Healthy Strategies		Post-Healthy Strategies		Follow up	
	Done	Not done	Done	Not done	Done	Not done
	%	%	%	%	%	%
Physical examination (testicular self-examination)	10.0	90.0	85.0	15.0	82.0	18.0
TWIST (Testicular Work-up for Ischemia and Suspected Torsion)	5.0	95.0	90.0	10.0	85.0	15.0
Nausea/vomiting relief	65.0	35.0	95.0	5.0	90.0	10.0
Pain relief (headache, abdomen and testis)	70.0	30.0	96.0	4.0	95.0	5.0
Personnel hygiene and hand washing	75.0	25.0	93.0	7.0	90.0	10.0
Wound care	45.0	55.0	92.0	8.0	90.0	10.0
Observing urine output and character of testis	40.0	60.0	95.0	5.0	90.0	10.0
Observing signs of infection	35.0	65.0	97.0	3.0	95.0	5.0
T-test P value	$X^2=26.6$ pre versus post healthy strategies					** P <0.001
	$X^2= 44.2$ pre- healthy strategies versus follow up					
	$X^2= 20.6$ post healthy strategies versus follow-up					

** Highly statistically significant P <0.001

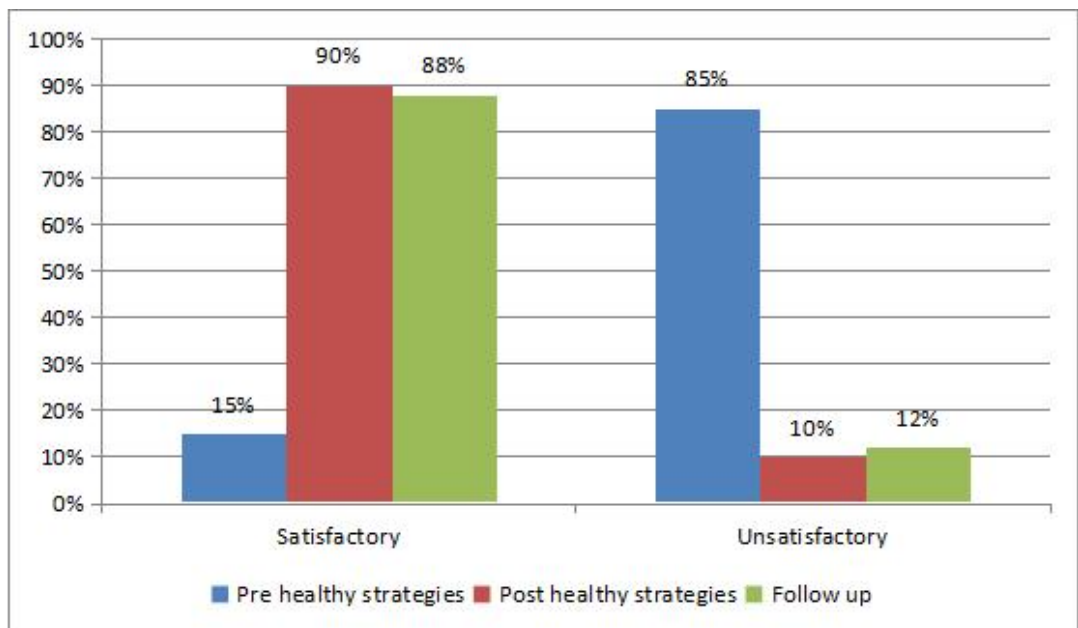


Figure (3): The Distribution of Total Parental Reported Practices regarding Testicular Torsion during Healthy Strategies Phases (n = 100).

Table (5): Total Parents' Attitudes Towards Preventing and Controlling Testicular Torsion Complications during Healthy Strategies Phases (n = 100).

	Pre-Health Strategies		Post-Health Strategies		Follow up		
	No	%	No	%	No	%	
Positive	10.0	10.0	85.0	85.0	82.0	82.0	
Indifferent	30.0	30.0	10.0	10.0	10.0	10.0	
Negative	50.0	50.0	5.0	5.0	8.0	8.0	
Mean attitude score	0.699±0.54		2.62±1.22		2.22±0.92		
X ²	X ² = 14.08 pre intervention versus post intervention X ² = 20.44 pre intervention versus follow up X ² = 13.62 Post intervention versus follow up					**P < 0.001	

** Highly statistically significant P < 0.001.

Table (6): Correlation Coefficient between Total Parental Knowledge, Practices and Attitude during Healthy Strategies Phases and Parental Characteristics (n=100).

Variables		Age		Educational qualification		Residence		Occupation	
		r	P	R	P	r	P	r	P
Knowledge	Pre healthy strategies	0.72	>0.05	0.248	0.001	0.40	>0.05	0.70	>0.05
	Post healthy strategies	0.544	0.001	0.145	>0.05	0.142	>0.05	0.041	>0.05
	Follow up	0.451	0.001	0.364	0.001	0.72	>0.05	0.152	>0.05
Practices	Pre healthy strategies	0.22	>0.05	0.42	>0.05	0.21	>0.05	0.031	>0.05
	Post healthy strategies	0.433	0.001	0.405	0.001	0.64	>0.05	0.130	>0.05
	Follow up	0.232	0.001	0.224	0.001	0.25	>0.05	0.52	>0.05
Attitude	Pre healthy strategies	0.22	>0.05	0.42	>0.05	0.21	>0.05	0.031	>0.05
	Post healthy strategies	0.433	0.001	0.405	0.001	0.64	>0.05	0.130	>0.05
	Follow up	0.232	0.001	0.224	0.001	0.25	>0.05	0.52	>0.05

* Statistically insignificant (p < 0.05)

** Highly statistical significant correlation (P < 0.001)

Discussion

Testicular torsion (TT) is one of the most frequent pediatric psychiatric urological emergencies. If family members are aware of the problem, they may be able to discover the injured testicle early on, take the necessary precautions, and save it. Torsion of the testicles is one of the most common causes of organ failure in young males (*Green et al., 2020*). Consequently, the current study aimed to evaluate the effectiveness of strategies on parents' awareness regarding preventing and controlling complications of testicular torsion in children.

Regarding the age range of children with testicular torsion, current study indicated that

approximately one half of the studied children were between the ages of 12 and 18 years, with a mean SD of \pm SD 12.85±1.46. This finding is consistent with *Lacy et al. (2023)* who discovered that testicular torsion occurs in all age groups, but it is more common after birth and between the ages of 12 and 18 years and recorded an annual incidence of 3,8 per 100,000 boys 18 years.

The current study's findings revealed that before implementing healthy strategies implementation, more than two-thirds of parents had unsatisfactory Knowledge of testicular torsion. These results are supported by *Alyami et al. (2019)* and *Bai et al. (2022)*,

who stated that the overall quality was subpar. The deceptive, erroneous, and incomplete information may endanger viewers' health, especially during the COVID-19 pandemic regarding testicular torsion. The research conducted by *Green et al. (2020)* has shown that there is a lack of broad understanding of testicular torsion, and this seems to apply to all societal and educational levels.

The study indicated that the majority of people have no idea that a testis might twist and, as a result, die. Similar to *Friedman et al. (2016)*, who claimed that there is little information in the literature about family awareness of a serious illness like TT in youngsters. As a result, the researchers felt it was critical to survey parents in order to evaluate their level of awareness. While the majority of the parents in the survey had solid knowledge, they promptly posted and followed up on the application of healthy methods. These findings align with those of *Saleem et al. (2017)*, who validated their findings in their study on "Knowledge, attitude, and practices regarding benign testicular disorders in educated young men in Pakistan." *Cureus*", there is an urgent need to raise awareness at all levels using various techniques and venues.

According to the study's findings related to the risk factors and causes of testicular torsion in children, increased testis and spermatic cord mobility accounted for more than two-thirds of the associated risk factors and causes of testicular torsion in children. This finding is consistent with the findings of *Guo et al. (2019)*, who revealed that this type of torsion is caused by structural defects or increased mobility of the testis and spermatic cord, resulting in venous return obstruction, restricted arterial flow, and ischemia. Teenagers are prone to TT, which can lead to testicular necrosis (*Bowlin et al., 2017*).

Based on the current study's findings, there are highly statistically significant improvements in parents' practice after the implementation of follow-up healthy strategies. An evidence-based strategy to enhance outcomes in testicular torsion for this cohort can now be created. This finding supported by *MacDonald et al., (2022)*. According to his study titled "Effective strategies for testicular

torsion education in adolescents: A qualitative study in educational environments," children with TT require early detection, assistance, and care in their daily activities; as a result, it is critical to improve parenting techniques and provide parents with experience caring for their children. Furthermore, the work of *Saleem et al. (2017)* is noteworthy.

According to studies, the population is taking additional steps to educate people about the many testicular ailments so that future aggravation can be averted by early detection and treatment. Additionally, *Macdonald et al., (2020)*, who proposed developing a program to teach young men about testicular health and wait' policy may be harmful in his paper "Why adolescents delay with presentation to hospital with acute testicular pain: a qualitative study". Moreover, *Bai et al., (2022)* who emphasized the importance of making significant efforts to improve the quality of health-related movies about testicular torsion. What is more *Faheim & Amer, (2019)* who reported in their study about "Effect of educational guidelines on parents' knowledge and practice regarding neonates and young children with Brachial Plexus injuries" that the mothers were provided with skills and activities and typically practiced. It by fitting it into their daily routine with their children, will improve function of the affected extremity while maintaining the children's well-being.

Considering parents' practice, the current study's results revealed a considerable improvement in post and follow-up tests compared to the pretest. The majority of parents lacked adequate testicular torsion practice and application. This finding concurred with *Saleem et al., (2017)*, who indicated that the practice of TSE BTDS in young educated men in Karachi is disturbingly low. Moreover, *Bagstaff et al. (2022)* revealed in their study on the "Testicular Torsion Study Protocol" that unsatisfactory outcomes are mostly caused by delays in diagnosis and treatment. As time passes the start of symptoms and surgical intervention, the more likely it is that persistent ischemia will occur, perhaps resulting in testicular loss. Meanwhile, *Green et al., (2020)* emphasized that testicular torsion is one of the most common reasons of a young boy losing an organ. Torsion kills more testes

than testicular cancer in school-age children, which is a grim statistic.

Additionally, *Bai et al., (2022)* who pointed out that additional work must be done to improve the quality of health-related videos about testicular torsion. According to the experts, TT is one of the most serious concerns that any community faces, and it can be decreased, improved, and complications prevented by raising awareness and educating parents, the community, and professionals.

Before the healthy strategies implemented, one half of the parents in the study had a negative attitude towards testicular torsion. However, immediately after and follow up of the healthy strategies, The majority of the study group was a positive attitude towards TT. *Montoya et al. (2023)* stated in their study on "Impact of an educational intervention on the knowledge of testicular self-examination and attitudes towards it" that an educational intervention on testicular self-examination improved the proportion of adolescents with an adequate attitude (5.6% vs. 53.5%) and adequate knowledge (18.3% vs.78.9%). After 6 months, the intervention was repeated, and the proportion of youth with an adequate attitude increased (53.5% vs. 86.4%). The findings of the researchers confirmed this.

The study conducted that there were sufficient knowledge, attitude and practice available throughout the immediate after and follow-up phases after implementation of healthy strategies. This result was in line with that of *Montoya, et al. (2023)*, who discovered an increase in knowledge following the initial intervention. Furthermore, according to *Saleem et al., (2017)*, there is a pressing need to raise awareness at all levels using a variety of strategies and platforms.

The significance of giving parents of children access to evidence-based healthy strategies that teaches children's fundamental abilities and makes clear that testicular torsion is one of the difficulties discussed. This result support by *MacDonald et al., (2022)*, They determined that developing and implementing PSHE (personal, social, health, and economic) programs will raise boys' and young men's knowledge of testicular torsion. It is now possible to develop an evidence-based

intervention to improve outcomes in children with testicular torsion. Physical examinations, nausea/vomiting relief, pain relief, personnel hygiene and hand washing, wound care, observing urine output, and signs of infection, according to the researchers, improve interactions between Parents and their children will receive better care as a result.

Finally, the results of the current study discovered that parents' knowledge, practice and attitude were improved after healthy strategies implementation. This could imply the significance and usefulness of healthy techniques in increasing parents' knowledge, practice, and attitude, all of which play an important part in the quality of care provided, problems prevention, and effective outcomes.

Limitation of study

The researchers encountered some challenges that should be considered, including some parents' rejection of taking part in the study. In addition to the deficiency of cases during the data-collection process at Port Said's General Hospitals. The researchers were able to get over this issue by obtaining the approval of the director of Al-Azhar Hospital in Damietta City to gather the sample required for the study. Furthermore, throughout the study's conduct, the researchers made multiple attempts to find references in the field of nursing related to testicular torsion prevention of complications in children, but they did not find adequate references.

Conclusion

Based on the results of the current study, it can be concluded that after an application of the healthy strategies, there is a significantly greater improvement in studied parent' knowledge, practices, and attitude regarding avoiding and controlling complications of testicular torsion in their children than it was before. Additionally, there was a statistically significant positive link between knowledge level and parents' age and educational level at both the pre- and post-implementation of healthy strategies. However, there were no statistically significant links between parents' overall behavior and their age or level of education before to, after immediately, or following the adoption of healthy strategies.

Recommendations

The following recommendations are suggested in light of the current study's findings:

Further research

- Early management research is recommended to avoid future complications and handicaps through establishing a database on the magnitude of the problem and determining its occurrence and distribution of the resources available on the appropriateness of preventative, care, and rehabilitation measures are eagerly sought.
- This study should be repeated in additional organizations with a large number of participants in order to generalize its findings and clinically verify the effectiveness of the application of healthy strategies.

Further education

- Parents should receive ongoing guidance and education for testicular torsion in their children. In order to avoid further complications, early detection and appropriate care using healthy strategies are required.

References

- Alyami FA, Modahi NH, Alharbi AM, Alkhelaif AA, Alhazmi H, Trbay MS, *et al.* Parents' awareness and knowledge of testicular torsion: A cross-sectional study. *Urol Ann* 2019;11:58-61. Doi: 10.4103/UA.UA_62_18.
- Bagstaff K., Lucy B., Jane B., John B., Helen C., Simon C., Andrew D., & James Greenet al.,(2022).Testicular torsion Study protocol. CEPOD, June 2022.
- Bai G, Pan X, Zhao T, Chen X, Liu G and Fu W (2022). Quality Assessment of YouTube Videos as an Information Source for Testicular Torsion. *Front. Public Health* 10:905609.Doi: 10.3389/fpubh.2022.905609 .
- Bowlin, P. R., Gatti, J. M., & Murphy, J. P. (2017). Pediatric testicular torsion. *Surgical Clinics*, 97(1), 161-172. DOI: [https:// doi. org/ 10. 1016/ j. suc. 2016. 08. 012](https://doi.org/10.1016/j.suc.2016.08.012).
- Faheim, S. S., & Amer, S. A. (2019). Effect of educational guideline on parents' knowledge and practice regarding neonates and young children with Brachial Plexus injuries. *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*, 8(04), 55-66.
- Ferreira, H. L. O. C., Siqueira, C. M., Sousa, L. B. D., Nicolau, A. I. O., Lima, T. M., Aquino, P. D. S., & Pinheiro, A. K. B. (2022). Efeito de intervenção educativa para adesão de adolescentes escolares à vacina contra o papilomavírus humano. *Revista da Escola de Enfermagem da USP*, 56.
- Friedman AA, Ahmed H, Gitlin JS, Palmer LS(2016). Standardized education and parental awareness are lacking for testicular torsion. *J Pediatr Urol*; 12: 166. e1-166.e8. 10.21608/EJHC.2021.196350.
- Green C., Stubbs V., Green JSA.,(2020). Public health education initiatives for testicular torsion. *Trends in Urology & Men's Health* | November/December 2020.
- Guo, X., Sun, L., Lei, W., Li, S., & Guo, H. (2020). Management of testicular torsion < 360° in children: a single-center, retrospective study. *Journal of International Medical Research*, 48(4), 0300060519895861. [https:// doi. org/ 10. 1177/ 0300060519895861](https://doi.org/10.1177/0300060519895861).
- Hallows, K. R., Li, H., Saitta, B., Sepehr, S., Huang, P., Pham, J., ... & Pastor-Soler, N. M. (2022). Beneficial effects of bempedoic acid treatment in polycystic kidney disease cells and mice. *Frontiers in Molecular Biosciences*, 9, 1001941.
- Jacobsen FM , Rudlang TM , Fode M , Østergren PB , Sønksen J , OhDA , Jensen CS., (2019). The Impact of Testicular Torsion on Testicular Function. *The world men's health*. [https:// doi. org/ 10. 5534/ wjmh. 190037](https://doi.org/10.5534/wjmh.190037).
- Jacobsen, F. M., Rudlang, T. M., Fode, M., Østergren, P. B., Sønksen, J., Ohl, D. A., & Jensen, C. F. S. (2020). The impact of testicular torsion on testicular function. *The world journal of men's health*, 38(3), 298.
- Kidd, K. M., Sequeira, G. M., Katz-Wise, S. L., Fechter-Leggett, M., Gandy, M., Herring, N., ... & Dowshen, N. L. (2023). "Difficult to Find, Stressful to Navigate": Parents' Experiences Accessing Affirming Care for Gender-Diverse Youth. *LGBT health*. [https:// doi. org/ 10. 1089/ lgbt. 2021. 0468](https://doi.org/10.1089/lgbt.2021.0468).

- Lacy, A., Smith, A., Koyfman, A., & Long, B. (2023).** High risk and low prevalence diseases: Testicular torsion. *The American Journal of Emergency Medicine*. [https:// doi. org/ 10. 1016/ j. ajem. 2023.01.031](https://doi.org/10.1016/j.ajem.2023.01.031).
- MacDonald CM , McCauley N , O'Toole S and Green J., (2022).** Effective strategies for testicular torsion education in adolescents: A qualitative study in educational environments. *Health Education Journal* .Vol. 81(3) 325–336 .
- MacDonald, C., Kronfli, R., Carachi, R., & O'Toole, S. (2018).** A systematic review and meta-analysis revealing realistic outcomes following paediatric torsion of testes. *Journal of Pediatric Urology*, 14(6), 503-509. [https:// doi. org/ 10. 1016/ j. jpuro. 2018.09.017](https://doi.org/10.1016/j.jpuro.2018.09.017).
- Macdonald, Caroline, Burton, Maria, Carachi, Robert and O'toole, Stuart (2020).** Why adolescents delay with presentation to hospital with acute testicular pain: a qualitative study. *Journal of Pediatric Surgery*.
- Montoya-Torres, J. R., Muñoz-Villamizar, A., & Mejia-Argueta, C. (2023).** Mapping research in logistics and supply chain management during COVID-19 pandemic. *International Journal of Logistics Research and Applications*, 26(4), 421-441.
- Saleem, D., Muneer, S., Khan, R. F. Y., Ochani, R. K., Ahmed, S. S., Begg, M., ... & Fatima, K. (2017).** Knowledge, attitude and practices regarding benign testicular disorders in the educated young men of Pakistan. *Cureus*, 9(8). DOI 10.7759/cureus.1563.
- Shunmugam, M., & Goldman, R. D. (2021).** Testicular torsion in children. *Canadian Family Physician*, 67(9), 669-671.
- Slobodin, O., & Davidovitch, M. (2019).** Gender differences in objective and subjective measures of ADHD among clinic-referred children. *Frontiers in human neuroscience*, 13, 441.
- Suen, L. K., Lai, C. K. Y., Wong, T. K. S., Chow, S. K. Y., Kong, S. K. F., Ho, J. Y. L., ... & Wong, I. Y. C. (2006).** Use of physical restraints in rehabilitation settings: staff knowledge, attitudes and predictors. *Journal of advanced nursing*, 55(1), 20-28. [https:// doi. org/ 10. 1111/ j.1365- 2648.2006.03883](https://doi.org/10.1111/j.1365-2648.2006.03883).
- Sugrue, D. D., O'Connor, E., & Davis, N. (2022).** Testicular torsion in Ireland: a 10-year analysis of incidence and risk of orchidectomy. *Irish Journal of Medical Science* (1971-), 1-8.
- Yilmaz, M., Hacibey, I., ÖZKUVANCI, Ü., YAZAR, R. Ö., & MÜSLÜMANOĞLU, A. Y. (2022).** Did the COVID-19 pandemic affect the Approach to Testicular Torsion Cases?. *Kafkas Journal of Medical Sciences*, 12(2), 141-145.