

Parental Awareness, Response, and Parent-Child Communication on Testicular Torsion: A Cross-Sectional Study in Sri Lanka

Jayaprasad Y. D. M.¹, Ratnatunga K. C.², Jayarathna D. C.¹, Gunasekare S. K. V.², Jayakody K. C.¹

¹Professorial Surgical Unit, Teaching Hospital, Peradeniya, Sri Lanka.

²Department of Surgery, University of Peradeniya, Sri Lanka.

Abstract

Background: Testicular torsion (TT) is an urological emergency that can lead to testicular loss if not promptly treated. Timely diagnosis and intervention are essential but delays often occur due to limited parental awareness. Assessing parental knowledge and responses is crucial for developing effective public health strategies.

Objectives: This study aimed to (1) assess parental awareness of TT within the Sri Lankan context, (2) identify parental responses to scrotal pain, (3) evaluate parent-child communication on testicular emergencies, and (4) examine associations between awareness and demographic factors such as education, occupation, and age.

Methods: cross-sectional study was conducted at a tertiary care hospital. Parents of male children attending urology and general surgical clinics were included. Parents of children with TT, those with only female children, and individuals with communication disabilities were excluded. Data were collected using self-administered questionnaires and analysed using descriptive statistics.

Results: Among the 260 surveyed parents, only 16.5% parents demonstrated awareness of TT, with awareness being significantly greater among those with higher education levels. When presented with scenarios involving scrotal pain, 54% opted to visit a hospital, 37% contacted a doctor, and 9% chose to wait for symptom resolution. A lack of knowledge and misinterpretation of symptoms were significant barriers identified.

Conclusion: Parental awareness of TT remains low, contributing to delayed care. Educational initiatives targeting parents and encouraging parent-child discussions are essential to improve early recognition and timely intervention.

Keywords: Testicular torsion, parental awareness, acute scrotal pain, paediatric urology, health literacy

Introduction

Testicular torsion (TT) is a frequently encountered urological emergency, particularly affecting males under the age of 25, with an estimated incidence of 1 in 4000 (1). The likelihood of occurrence significantly decreases beyond the age of 35 (2). Prompt diagnosis and treatment are essential; as testicular viability is highly time-sensitive (3). When addressed within the first six hours of onset, over 90% of testes can be salvaged. However, the chance of recovery falls dramatically if intervention is delayed beyond 24 hours (4-6).

Prior studies have indicated that in approximately 30% to 50% of testicular torsion cases, delayed diagnosis results in the need for orchiectomy due to irreversible ischemic injury to the testis (7, 8). Notably, these delays often occur before the patient reaches the hospital (5, 9). Evidence also suggests that limited awareness among parents and male adolescents regarding the urgency of scrotal pain contributes significantly to postponement in seeking medical attention, thereby reducing the chances of testicular salvage (10-12).

As a result, raising widespread awareness of testicular torsion appears to be critical for timely

intervention and saving the testis. Despite being a common surgical emergency, evidence in the literature concerning awareness of testicular torsion is limited. To date, no published data from Sri Lanka address this issue. Therefore, this study seeks to (1) assess parental awareness of testicular torsion (TT) within the Sri Lankan context, (2) explore parental responses and decision-making patterns when confronted with scrotal pain in children, (3) evaluate parent-child communication regarding testicular emergencies, and (4) examine associations between awareness levels and demographic factors such as education, occupation, and age. This information is crucial for informing future educational campaigns aimed at preventing testicular loss due to delayed intervention.

Materials and methods

Study design and settings

This descriptive cross-sectional study was carried out at a tertiary-level hospital in Sri Lanka from August 2023 to August 2024. Data collection was conducted in an outpatient settings, specifically targeting urology and general surgical clinics.

Sampling strategy

Sample size determination was based on a widely accepted formula used in cross-sectional studies.

Sample size formula:

$$n = (Z^2 \times P \times (1 - P)) / d^2$$

Where:

n = Sample size

Z = Z statistic for a level of confidence

P = Expected prevalence or proportion

d = Precision

Here, we used 19% as the expected prevalence on the basis of the study by Fahad A. Alyami et al (13). The Z value was taken as 1.96 at a 95% confidence interval. Additionally, a 5% acceptable precision (d=0.05) was applied. To increase the power of our study, we decided to use an additional 10% increase in the study population. Therefore, the final estimated sample size was 260.

Inclusion and exclusion criteria

We invited all the parents of male children who attended urology and general surgical clinics to participate in the study, irrespective of their age and educational background. Parents with only female children, parents whose children suffered from testicular torsion, and patients with disabilities and an inability to communicate were excluded from the study.

Ethical clearance and data collection methods

Ethical approval was obtained from the institutional Ethics Review Committee (Ref: THP/PLANNING/ERC/19/2023). A structured, self-administered questionnaire was developed based on the "Parent/Guardian REDCap Survey" by Taylor Abby (University of Nebraska Medical Center) (14), with adaptations for the Sri Lankan context. The questionnaire consisted of 11 items covering: (1) demographic data (age, gender, education, occupation), (2) presence and age of male children, (3) parental responses to scenarios involving scrotal pain, and (4) awareness of testicular torsion. For the purposes of this study, a participant was considered "aware" if they responded affirmatively to the question, "Have you ever heard of testicular torsion or a twisted testicle?" The questionnaire was provided in all three national languages – Sinhala, Tamil, and English – to ensure accessibility. Prior to data collection, written informed consent was secured from each participant. Additionally, a pilot study was conducted to identify and address any issues in the clarity or structure of the survey tool.

Data analysis

Data entry and analysis were performed using IBM SPSS Statistics version 23. The dataset was summarized using descriptive measures, including frequencies and percentages. To explore potential associations between categorical variables – such as parental awareness of testicular torsion and demographic factors like age, gender, education level, and occupation – the Pearson chi-square test was applied. Statistical significance was determined at a threshold of $p < 0.05$.

Results

The study included 260 participants, with a majority being female (58.9%) and aged 30-59 years

(83.1%). Educational attainment was primarily at the secondary level (O/L: 37.7%, A/L: 39.6%), while only 7.7% held higher education degrees. A small proportion (13.8%) worked in the health sector, with the remainder (86.2%) representing non-healthcare backgrounds. The sample thus reflects a predominantly middle-aged, moderately educated female population with limited health sector involvement (Table 1).

Among the 260 parents, 217 parents (83.5%) were unaware of testicular torsion, and only 43 (16.5%) were aware of testicular torsion (Figure 1).

Among the 43 parents who were aware of testicular torsion, 20 (46.5%) were males, and 23 (53.5%) were females ($p>0.05$). Considering the parents were aware of testicular torsion, the source of knowledge was a doctor (11 parents; 25.5%).

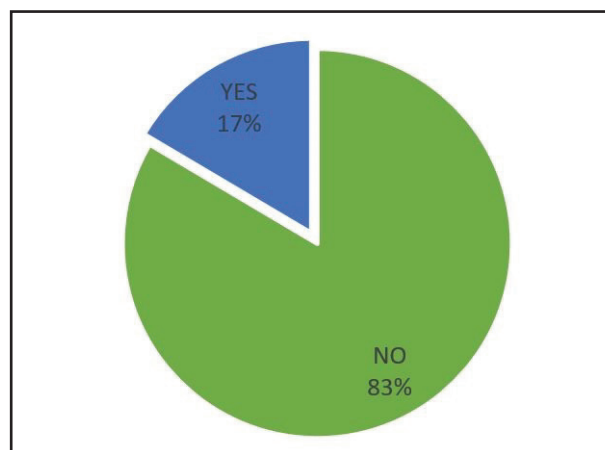


Figure 1. Overall awareness of testicular torsion among parents.

The figure shows that 16.5% of parents were aware of testicular torsion, while 83.5% were unaware.

Table 1. Sociodemographic characteristics of study participants (N=260)

Parent's Gender	Male	107	41.1%
	Female	153	58.9%
Parent's Age (Years)	<20	8	3.1%
	20-29	18	6.9%
	30-39	72	27.7%
	40-49	74	28.5%
	50-59	70	26.9%
	60 - 69	14	5.4%
	>70	4	1.5%
Parent's Education Level (O/L - Ordinary Level A/L - Advanced Level)	Primary Education	39	15.0%
	Up to O/L	98	37.7%
	Up to A/L	103	39.6%
	Higher Education	20	7.7%
Work in Health Sector	Yes	36	13.8%
	No	224	86.2%

The others included a family member or a friend (21%), TV or radio (16%), their own training (13.9%), the internet (13.9%), and newspapers (9%) in descending order.

When stratified by age, awareness levels were as follows: 25.6% among participants aged 30-39 years, 25.6% among those aged 40-49 years, and 30.2% among those aged 50-59 years. A small proportion of parents aged below 30 years or above 60 years also demonstrated awareness. However, no statistically significant association was observed between age group and awareness ($p>0.05$).

Figure 2 shows the relationship between awareness of testicular torsion and the parent's educational level. Considering the parents only with primary education, out of 39 parents, one (2.6%) was aware of testicular torsion, and 38 parents (97.4%) were unaware of the condition. However, when it comes to the higher education group, out of 20 parents, 9 parents (45%) were aware of testicular torsion, and 11 parents (55%) were unaware of the condition. This means that a relatively greater number of parents were aware of testicular torsion when their educational status improved ($p<0.05$).

Importantly, 36 parents (13.8%) reported employment in the health sector; however, 18 of them (50%) were unaware of testicular torsion. The absence of role-specific information (e.g., physician,

nurse, attendant) limits the interpretation of this finding.

Figure 3 shows the parents' responses to their children's scrotal pain. The majority responded that they would immediately take the child to the hospital (141 parents; 54.2%) or contact a doctor (97 parents; 37.3%).

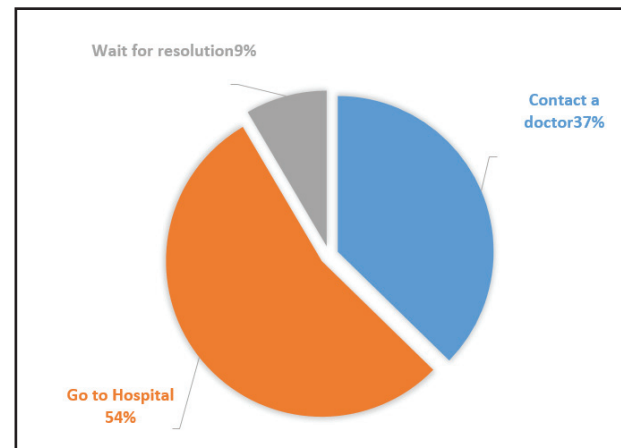


Figure 3. Parental responses to children's scrotal pain.

Only 22 parents (8.5%) responded that they would wait for the symptoms to resolve. In this group of 22 parents, 9 parents (40%) responded that they would wait less than one hour for symptoms to resolve, 8 parents 1-3 hours (36.4%), 3 parents 3-6 hours (13.6%), and only 2 parents would wait more than 6 hours (9%).

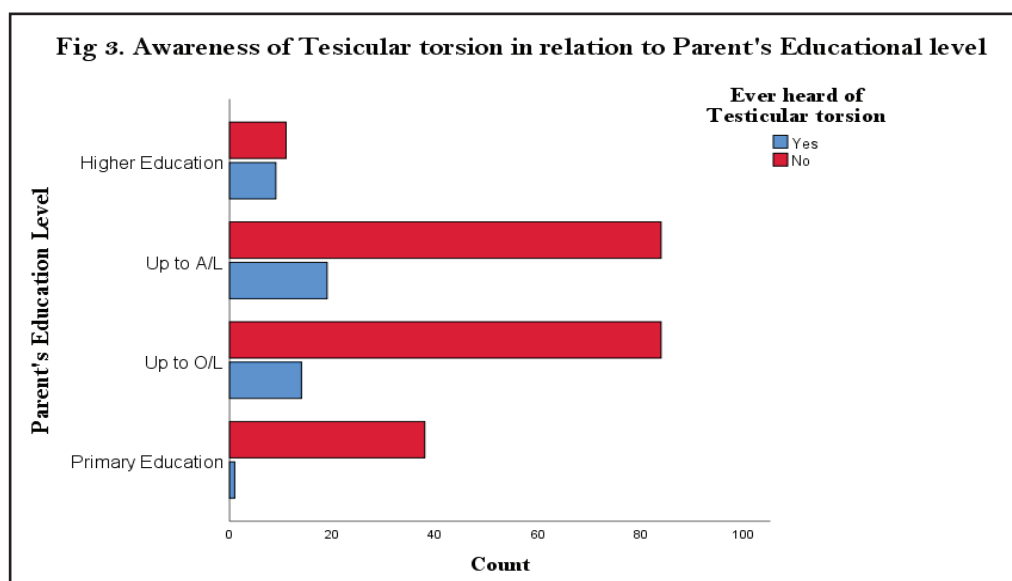


Figure 2. Awareness of testicular torsion by parental educational level.

Among all the parents, 16 (6.2%) had discussed with their sons what to do if they developed acute testicular pain. A total of 244 parents (93.8%) had never discussed this matter with their sons, and 34 parents who were aware of testicular torsion were included in this group. Only nine parents with awareness of testicular torsion had discussed this matter with their sons. The study did not evaluate the underlying reasons for this lack of discussion.

Discussion

Parents' knowledge of testicular torsion and their responses to possible torsion in a cohort of Sri Lankan individuals was assessed in the present study. We believe it is crucial to evaluate the target population's current level of health literacy and awareness regarding testicular torsion to improve public health education.

Fahad, Alyami and colleagues surveyed the knowledge of parents regarding testicular torsion in paediatric urology and paediatric general clinics in Saudi Arabia. It was discovered that 19% of parents in the former were aware of the condition, whereas 14% in the latter were aware of the condition (13). Another study by Friedman et al. investigated parents' knowledge of testicular torsion in paediatric urology and ENT (ear, nose, throat) clinics in the United States and reported that 36% of parents in the former and 35% in the latter were aware of the condition (12). An Irish study by Lee Chien Yap et al. revealed that a greater percentage of parents (56%) were aware of testicular torsion in their paediatric clinics (14). Abelson et al. also conducted a similar investigation, revealing a higher percentage of awareness (55.7%) among their study population (15). A northern Saudi study also revealed comparable results, with 47.8% of the respondents being aware of testicular torsion (16). Similarly, Ubee et al. demonstrated that parental perception of acute scrotal pain in children was often inadequate, potentially delaying presentation and reducing the chances of testicular salvage (17). In our study population, only 16.5% of parents were aware of testicular torsion, which is noticeably lower than the majority of the aforementioned studies, highlighting a distinct deficiency in knowledge concerning testicular torsion within our study population. These findings underscore the need to educate parents about this surgical emergency.

In Friedman et al.'s study, the majority of parents with awareness of testicular torsion (35.4% from urology clinics and 54.5% from ENT clinics) reported that "word of mouth" – a friend, relative, or someone who had torsion – was their source of knowledge (12). In the study by Fahad, Alyami et al., the majority of parents gained their knowledge through their doctor (42.1%) (13). In our study, the primary source of knowledge was also a doctor, with family members or friends following closely behind. We observe that the media platforms (TV, radio, internet) were underutilized as sources of knowledge. Public health authorities should leverage these channels to enhance awareness campaigns.

Our study revealed no statistically significant relationship between parents' gender or age and awareness. However, a relatively greater number of parents were aware of testicular torsion in the higher education group.

Our findings show a statistically significant association between higher education and awareness of TT ($p < 0.05$). In contrast, no significant association was observed between awareness and either age or gender ($p > 0.05$).

Despite the low awareness among our study population, we observed that the majority of parents (54.2%) were planning to take their child to the hospital in response to acute testicular pain. However, the fact that we explained the study's aim to them at the beginning of the questionnaire may have biased their response. The remaining majority of the parents (37.3%) answered that they would call a doctor/paediatrician. Nevertheless, this is a positive trend we noticed during our analysis. Friedman et al. and Fahad A. Alyami and colleagues reported similar results to those of our study: most drive their children straight to the emergency department or call their paediatricians (12,13).

Another noteworthy finding of our study is that the majority of the parents (93.8%) had never discussed this matter with their sons, and surprisingly, 34 parents (nearly 80%) with awareness of testicular torsion were in this group. In their study, Friedman et al. reported that there was little parent-to-child communication regarding testicular torsion (12). This persistent gap in discussion,

despite awareness, suggests systemic barriers to parent-child health communication about sensitive topics, which warrant further qualitative investigation into cultural, educational, and psychological factors influencing this pattern.

That 50% of healthcare-affiliated parents were unaware of TT is particularly concerning. This suggests that even within the health sector, awareness may be insufficient. Future studies should categorize healthcare roles to assess knowledge gaps more precisely.

Even though it is beyond the scope of this study, we firmly believe that boys must also be educated regarding the importance of seeking early medical care in the case of acute testicular pain. This is another aspect that we should focus on when conducting awareness programs.

Strengths and weaknesses of the present study

To the best of our knowledge, this study is the first within Sri Lanka to explore the awareness of testicular torsion. Additionally, the study identified a significant knowledge gap concerning testicular torsion within the population. A notable strength of this study is that the questionnaire was provided in all three main languages (Sinhala, Tamil, and English), promoting inclusivity and enhancing accessibility across different linguistic groups. Furthermore, the study uncovered a gap in parent-to-child communication regarding testicular health, which is an important and underexplored area. However, owing to the cross-sectional nature of the study, the results may not accurately reflect the level of awareness of this issue in other regions of Sri Lanka. Since we used a questionnaire-based survey, the results are prone to recall and self-report bias. Finally, despite providing the questionnaire in all three languages, we acknowledge the failure to properly validate the Sinhala and Tamil translations as a limitation of the study.

Conclusion

This study highlights a significant gap in parental awareness of testicular torsion in Sri Lanka, a delay which may contribute to avoidable orchiectomies. Awareness programs targeting both the public and healthcare workers are essential. Further, education efforts should include school-based initiatives and digital media campaigns to promote

early recognition and response to acute scrotal pain. This ensures that in the future, parents will respond appropriately to potential torsion in their children.

Author contributions

JYDM: Conceptualization, Data collection, Manuscript writing; All others: Data collection, Critical revision, Literature review, Manuscript editing.

Acknowledgements

We would like to thank the Clinic staff of Teaching Hospital Peradeniya for their support.

Conflicts of interest

The authors declare no conflicts of interest.

Financial support

This study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Statement on ethical clearance and consent for participation

Ethical clearance was obtained from the Ethics Review Committee of Teaching Hospital Peradeniya (THP/PLANNING/ERC/19/2023). Informed written consent was taken from the parents prior to participation of this study.

Statement on data availability

The datasets generated and/or analysed during the current study are not publicly available due to ethical and privacy considerations but are available from the corresponding author on reasonable request and with appropriate institutional approval.

References

1. Drlik M, Kocvara R. Torsion of spermatic cord in children: a review. *J Pediatr Urol.* 2013; 9(3): 259-66. DOI: 10.1016/j.jpuro.2012.05.016. PubMed PMID/PMCID. 22763105.
2. Wang CL, Aryal B, Oto A, Allen BC, Akin O, Alexander LF, et al. ACR Appropriateness Criteria(®) Acute Onset of Scrotal Pain-Without Trauma, Without Antecedent Mass. *J Am Coll Radiol.* 2019; 16(5s): S38-s43. DOI: 10.1016/j.jacr.2019.02.016. PubMed PMID/PMCID. 31054757.

3. Bayne CE, Villanueva J, Davis TD, Pohl HG, Rushton HG. Factors Associated with Delayed Presentation and Misdiagnosis of Testicular Torsion: A Case-Control Study. *J Pediatr.* 2017;186(200-4). DOI: 10.1016/j.jpeds.2017.03.037. PubMed PMID/PMCID. 28427778.
4. Donohue RE, Utley WL. Torsion of spermatic cord. *Urology.* 1978; 11(1): 33-6. DOI: 10.1016/0090-4295(78)90195-4. PubMed PMID/PMCID. 622758.
5. Barada JH, Weingarten JL, Cromie WJ. Testicular salvage and age-related delay in the presentation of testicular torsion. *J Urol.* 1989; 142(3): 746-8. DOI: 10.1016/s0022-5347(17)38875-4. PubMed PMID/PMCID. 2769854.
6. Mellick LB. Torsion of the testicle: it is time to stop tossing the dice. *Pediatr Emerg Care.* 2012; 28(1): 80-6. DOI: 10.1097/PEC.0b013e31823f5ed9. PubMed PMID/PMCID. 22217895.
7. Zhao LC, Lautz TB, Meeks JJ, Maizels M. Pediatric testicular torsion epidemiology using a national database: incidence, risk of orchiectomy and possible measures toward improving the quality of care. *J Urol.* 2011; 186(5): 2009-13. DOI: 10.1016/j.juro.2011.07.024. PubMed PMID/PMCID. 21944120.
8. Cost NG, Bush NC, Barber TD, Huang R, Baker LA. Pediatric testicular torsion: demographics of national orchiopexy versus orchiectomy rates. *J Urol.* 2011; 185(6 Suppl): 2459-63. DOI: 10.1016/j.juro.2011.01.016. PubMed PMID/PMCID. 21527194.
9. Pogorelic Z, Mustapic K, Jukic M, Todoric J, Mrklic I, Meštrovic J, et al. Management of acute scrotum in children: a 25-year single center experience on 558 pediatric patients. *Can J Urol.* 2016; 23(6): 8594-601. DOI. PubMed PMID/PMCID. 27995859.
10. Yap LC, Keenan R, Khan J, Cozman C, Dowling C, Cullen I, Darcy F. Parental awareness of testicular torsion amongst Irish parents. *World J Urol.* 2018; 36(9): 1485-8. DOI: 10.1007/s00345-018-2269-8. PubMed PMID/PMCID. 29594530.
11. Congeni J, Miller SF, Bennett CL. Awareness of genital health in young male athletes. *Clin J Sport Med.* 2005; 15(1): 22-6. DOI: 10.1097/00042752-200501000-00005. PubMed PMID/PMCID. 15654187.
12. Friedman AA, Ahmed H, Gitlin JS, Palmer LS. Standardized education and parental awareness are lacking for testicular torsion. *J Pediatr Urol.* 2016; 12(3): 166.e1-8. DOI: 10.1016/j.jpuro.2016.01.008. PubMed PMID/PMCID. 26994588.
13. Alyami FA, Modahi NH, Alharbi AM, Alkhelaif AA, Alhazmi H, Trbay MS, Neel KF. Parents' awareness and knowledge of testicular torsion: A cross-sectional study. *Urol Ann.* 2019; 11(1): 58-61. DOI: 10.4103/ua.Ua_62_18. PubMed PMID/PMCID. PMC6362777.
14. Taylor A. "Testicular torsion education: Improving awareness among boys and their caregivers regarding the urgency of evaluating scrotal pain" 2022; (184). Available from: https://digitalcommons.unmc.edu/coph_slce/184