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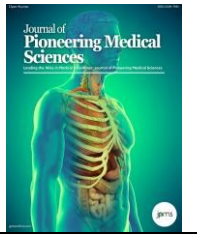

Assessing Parental Awareness and Knowledge of Testicular Torsion in Majmaah, Kingdom of Saudi Arabia: A Cross-sectional Study

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Abstract: **Introduction:** Testicular torsion, an infrequent yet grave urological condition, manifests with intense pain and swelling, necessitating prompt diagnosis and immediate treatment within a narrow timeframe, typically ranging from 6 to 8 hours. This study aims to comprehensively evaluate parental understanding of testicular torsion, pinpointing areas for targeted educational interventions. **Material and methods:** A descriptive cross-sectional community-based study was conducted. The study was conducted among parents residing in Al Majmaah Governorate, Saudi Arabia, which is situated in the center of the Kingdom within the Al-Riyad Region. Al Majmaah, known as the capital of the Sudair region in Najd and its largest city, spans an area of 30,000 square kilometers with a population exceeding 133,285 individuals. All parents meeting the inclusion criteria, including residency in Al Majmaah Governorate, age 18 and above, and willingness to participate, were involved in the study, while those not meeting these criteria were excluded. The sample size calculation, utilizing a probability sampling formula, determined a requirement of 425 participants, considering a 95% confidence level and a 10% non-response rate. The study duration spanned six months, from July 2023 to December 2023. **Results:** The majority of respondents fell within the age range of 18-35 years, with 41.4% aged 18-25 and 26.7% aged 26-35. Older age groups were represented by 23.8% aged 36-45, 6.2% aged 46-55, and only 1.9% aged over 55 years. Females constituted 61.4% of the sample, while males accounted for 38.6%. Saudi nationals comprised the majority (92.4%) of participants, with non-Saudis making up the remaining 7.6%. Mothers, fathers, and other relatives represented 34.3%, 24.8%, and 41.0%, respectively, in terms of their relationship to the child. When faced with scrotal pain, a significant portion (45.2%) indicated immediate hospital visits during working hours, rising to 61.9% over weekends, reflecting a heightened sense of urgency. The perception of scrotal pain seriousness varied, with severe pain and testicular changes identified as key indicators by the majority, while 19.0% relied on past pain severity knowledge. **Conclusion:** This study illuminates key demographic factors associated with variations in awareness levels, and it underscores the pressing need for sustained efforts to enhance public understanding of testicular torsion.

Keywords: Awareness, testicular torsion, Knowledge, Saudi Arabia.

INTRODUCTION

Testicular torsion, an infrequent yet grave urological condition, manifests with intense pain and swelling, necessitating prompt diagnosis and immediate treatment within a narrow timeframe typically ranging from 6 to 8 hours.[1] The urgency in seeking medical attention is paramount, as delays may lead to ischemic or infarcted testes, potentially culminating in the need for surgical removal via orchiectomy. This surgical emergency ensues when the testicle twists on its cord, obstructing blood flow and precipitating dire consequences if left unaddressed. Incidence statistics reveal that of approximately 1 in 4000 males under 25 years, it is the adolescents who pose the greatest risk.[2] Early diagnosis and treatment are critical because they represent a preventive measure against the irreversible impairment of the testis and subsequent loss of fertility. Surgical intervention in the restoration of blood supply to the affected testicle

represents the treatment for testicular torsion. A delay in diagnosis and resultant surgery means a risk of increased loss of testicles and reduction of fertility; hence, early medical intervention is also critical.[3] Patients with past or family experiences with torsion will be candidates for testicular fixation to prevent future attacks.

Public education about testicular torsion takes an important role in helping identify cases earlier, thus initiating prompt diagnostic and therapeutic intervention leading to the prevention of potentially irreversible damage and impairment of fertility. Education programs targeting the male youth, their parents, and the healthcare providers increase vigilance over the symptoms of this possibly fatal condition, meaning prompt identification for treatment.[4] Education creates awareness about the disease and its symptoms, thus enabling people to seek early treatment. Heightened awareness eventually means better results and retention of reproductive health for those patients suffering from testicular torsion.[5] Testicular torsion is one of the critical emergencies when the urologist encounters spermatic cord torsion that leads to an interruption in the supply of blood to the testis. If not diagnosed and addressed promptly, it leads to testicular ischemia and necrosis, hence risking the patient's infertility or even the loss of the testis. Though it is most common in children and adolescents, it may occur to anyone of any age, leading to some serious health conditions. Thus, the symptoms need to be noticed and treated early for the protection of testicular functions and the prevention of harmful sequelae.[6]

Knowledge on the part of parents can serve as a significant factor in the early detection and management of testicular torsion, especially in pediatric patients, wherein the parents are always considered the chief or main healthcare decision-makers for the family. However, such study findings indicate a vacuum of knowledge among parents about the signs, risks, and urgency of torsion, which contributes to late treatment and despairing results. The Kingdom of Saudi Arabia (KSA) constitutes a culture-based and sociological background from which health-seeking behavior is shaped; hence, it is advantageous to be aware of parental awareness concerning testicular torsion. Majmaah, residing within the Al-Riyad Region, constitutes the most suitable demographic context in which to examine the awareness of parents within a community-based framework. This study aims to comprehensively evaluate parental understanding of testicular torsion, pinpointing areas for targeted educational interventions. Insights garnered may inform healthcare providers and policymakers in devising effective public health strategies, bolstering awareness, and improving community healthcare delivery. This research endeavors to enrich existing knowledge on testicular torsion awareness among KSA parents, particularly within the Majmaah community. Ultimately, the findings promise to inform tailored interventions and educational initiatives, ameliorating parental awareness and curbing delays in testicular torsion diagnosis and management. Such endeavors stand to safeguard reproductive health and well-being within the community.

MATERIAL AND METHODS

A descriptive cross-sectional community-based study was conducted. The study was conducted among parents residing in Al Majmaah Governorate, Saudi Arabia, which is situated in the center of the Kingdom within the Al-Riyad Region. Al Majmaah, known as the capital of the Sudair region in Najd and its largest city, spans an area of 30,000 square kilometers with a population exceeding 133,285 individuals. All parents meeting the inclusion criteria, including residency in Al Majmaah Governorate, age 18 and above, and willingness to participate, were involved in the study, while those not meeting these criteria were excluded. The sample size calculation, utilizing a probability sampling formula, determined a requirement of 425 participants, considering a 95% confidence level and a 10% non-response rate.[5] The study duration spanned six months, from July 2023 to December 2023.

Data collection involved a self-administered questionnaire targeting parents in Majmaah City, Saudi Arabia, regardless of their awareness of testicular torsion. The questionnaire comprised two sections, one focusing on socioeconomic information and the other on parental responses to children's acute scrotal pain and knowledge of testicular torsion.

Data analysis was performed using SPSS version 20, where descriptive statistics summarized the data, presenting numerical data as mean ± SD or as median and range according to the distribution type of each variable, and percentages and frequencies represented categorical variables. Group comparisons were conducted using the Student's t-test or Mann-Whitney test, and the Chi-squared test was utilized to assess associations between categorical variables. A p-value less than 0.05 was considered significant, with a Confidence interval (CI) set at 95%. Ethical considerations included submission of the study to the Majmaah University Institutional Research Board (IRB) for approval, and survey responses were collected anonymously to maintain confidentiality and avoid gathering any identifying or private information from participants.

RESULTS

Table 1: Distribution of study participants as per socio-demographic characteristics

Variable	Category	Frequency	Percent
Age	18-25	87	41.4
	26-35	56	26.7
	36-45	50	23.8
	46-55	13	6.2
	More than 55	4	1.9
Gender	Female	129	61.4
	Male	81	38.6
Nationality	Saudi	194	92.4
	Non-Saudi	16	7.6
Relation to the child	Mother	72	34.3
	Father	52	24.8
	Other	86	41.0
Education level	illiterate	1	.5
	Primary	1	.5
	Middle	3	1.4
	Secondary	39	18.6
	University	166	79.0
Employment	No	105	50.0
	Yes	105	50.0
Number of daughters	0	64	30.5
	1-2	69	32.9
	3-4	60	28.6
	>=5	17	8.1
Number of sons	0	51	24.3
	1-2	113	53.8
	3-4	43	20.5
	>=5	3	1.4

The demographic characteristics of the study participants revealed a diverse distribution across various categories. In terms of age, the majority of respondents were between 18 and 35 years old, with 41.4% falling within the 18-25 age range and 26.7% between 26-35 years old. A smaller proportion of participants were distributed across older age groups, with 23.8% aged 36-45, 6.2% aged 46-55, and only 1.9% aged over 55 years. Regarding gender, the study sample comprised 61.4% females and 38.6% males. The majority of participants were Saudi nationals, accounting for 92.4% of the sample, while non-Saudis constituted 7.6%. In terms of their relationship to the child, respondents identified as mothers constituted 34.3%, fathers 24.8%, and others 41.0%. Regarding educational attainment, a significant proportion of participants had completed university education (79.0%), followed by secondary education (18.6%), while smaller percentages represented primary, middle, and illiterate categories. In terms of employment status, an equal distribution was observed, with 50.0% of respondents indicating employment and the remaining 50.0% reporting no employment. Analysis of family composition revealed varying numbers of daughters and sons among participants. For daughters, 30.5% of respondents reported having none, while 32.9% had 1-2 daughters, 28.6% had 3-4 daughters, and 8.1% had 5 or more daughters. Similarly, for sons, 24.3% reported having none, 53.8% had 1-2 sons, 20.5% had 3-4 sons, and only 1.4% had five or more sons (Table 1).

Table 2: Knowledge assessment

Variable	Category	Frequency	Percent
If your child complains of pain in the scrotum (during working hours), what will you do?	I will arrange an appointment with the urology clinic	62	29.5
	Put ice on it and try some home remedies	39	18.6
	Give him over-the-counter medication	14	6.7
	Drive him to the hospital immediately	95	45.2
If your child complains of pain in the scrotum (over the weekend), what will you do?	I will arrange an appointment with the urology clinic	45	21.4
	Put ice on it and try some home remedies	24	11.4
	Give him over-the-counter medication	11	5.2
	Drive him to the hospital immediately	130	61.9
At the time, what makes you think this pain is a serious condition?	If you try at home to put ice on or give him medication and the pain is not relieved by it	23	11.0
	If the pain is not relieve in a short time	71	33.8
	Severe pain and the appearance of the testis	62	29.5
	Your previous knowledge about how serous scrotal pain is	40	19.0
	I don't think this pain seems serious	14	6.7
Do you know when the	Immediately	23	11.0

symptoms of testicular torsion appear (extremely severe pain)?	Hours	41	19.5
	Few days	31	14.8
	I don't Know	115	54.8
Torsion of the testicular is more common between ages:	Children (0-12)	39	18.6
	Adolescents (12-18)	57	27.1
	Adults (older than 18)	25	11.9
	I don't Know	89	42.4
Symptoms of testicular torsion	Fever	42	20.0
	Scrotal pain	98	46.7
	Swelling of the scrotum	94	44.8
	Nausea	46	21.9
	Headache	36	17.1
	Abdominal pain	45	21.4
	Change in the color of the skin surrounding the scrotum	52	24.8
	Vomiting	32	15.2
	I don't Know	83	39.5
Do you know the risk factors for testicular torsion?	Anatomic malformation	36	17.1
	Family history of testicular torsion	52	24.8
	Related to activity, trauma during sleep	45	21.4
	Age	45	21.4
	Previous testicular torsion	57	27.1
	I don't Know	103	49.0
Do you know the complications of testicular torsion?	Infertility	77	36.7
	Death of the testicle	48	22.9
	Lower fertility	23	11.0
	No complications	13	6.2
	I don't Know	92	43.8
What is the appropriate time for surgical intervention?	Within 4-6 hours	41	19.5
	Within 12 hours	38	18.1
	I don't Know	131	62.4

The responses provided by the participants offer valuable insights into parental attitudes and knowledge regarding the management and understanding of testicular torsion symptoms and appropriate actions to take in case of scrotal pain in their children (Table 2). When faced with scrotal pain during working hours, a significant portion of parents (45.2%) indicated that they would immediately drive their child to the hospital, recognizing the urgency of the situation. However, over the weekend, an even higher percentage (61.9%) expressed readiness to take their child to the hospital immediately, suggesting a heightened sense of urgency during non-working hours. Regarding the perception of the seriousness of scrotal pain, the majority of respondents identified severe pain and changes in testicular appearance as indicators of a serious condition. At the same time, a smaller proportion (19.0%) relied on their previous knowledge of scrotal pain severity.

Furthermore, a notable proportion of parents (54.8%) admitted uncertainty regarding when the symptoms of testicular torsion typically appear, indicating a potential gap in knowledge regarding the early signs of this condition. Similarly, a significant number of respondents (42.4%) were unaware of the age group most susceptible to testicular torsion, reflecting a lack of understanding regarding its epidemiology. Regarding symptoms, while scrotal pain was recognized by nearly half of the participants (46.7%), other symptoms, such as swelling of the scrotum (44.8%) and changes in skin color (24.8%), were less commonly identified (Figure 1).

Moreover, the majority of respondents (49.0%) admitted to not knowing the risk factors for testicular torsion, highlighting a need for education in this area (Figure 2). Additionally, while a substantial portion of parents (36.7%) recognized infertility as a potential complication of testicular torsion, a significant percentage (43.8%) were unaware of any complications associated with the condition (Figure 3). Lastly, a majority of participants (62.4%) were uncertain about the appropriate time for surgical intervention in cases of testicular torsion, indicating a need for clearer guidance on treatment timelines.

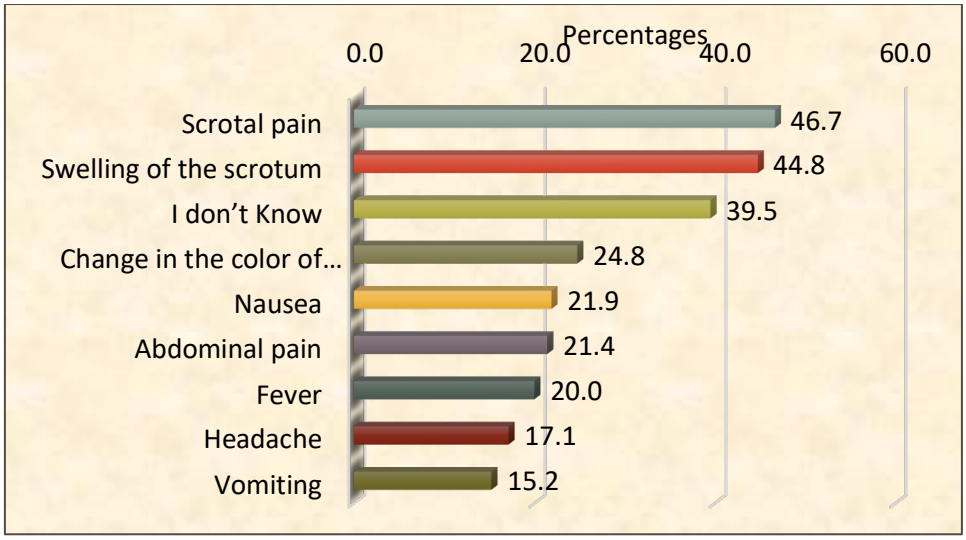

Figure 2: Do you know the risk factors for testicular torsion?

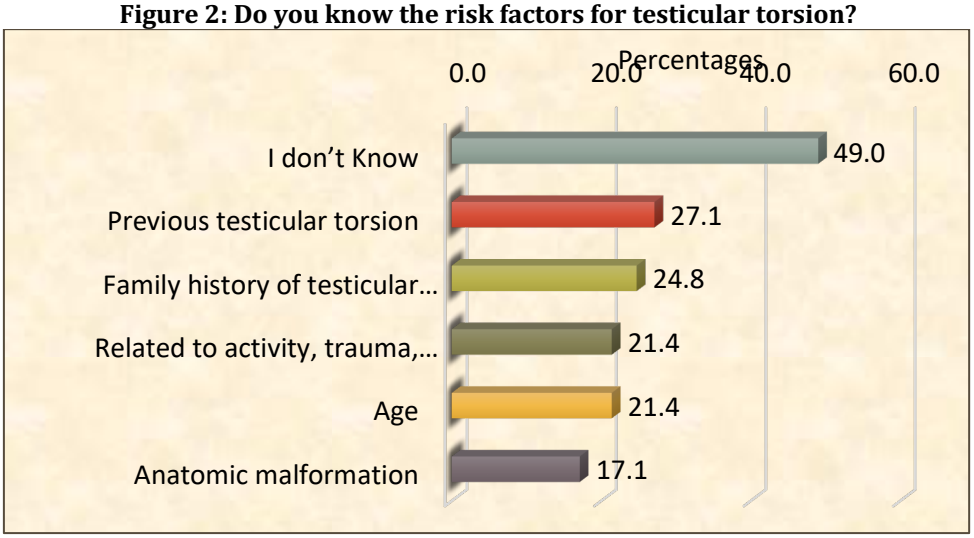

Figure 1: Symptoms of testicular torsion

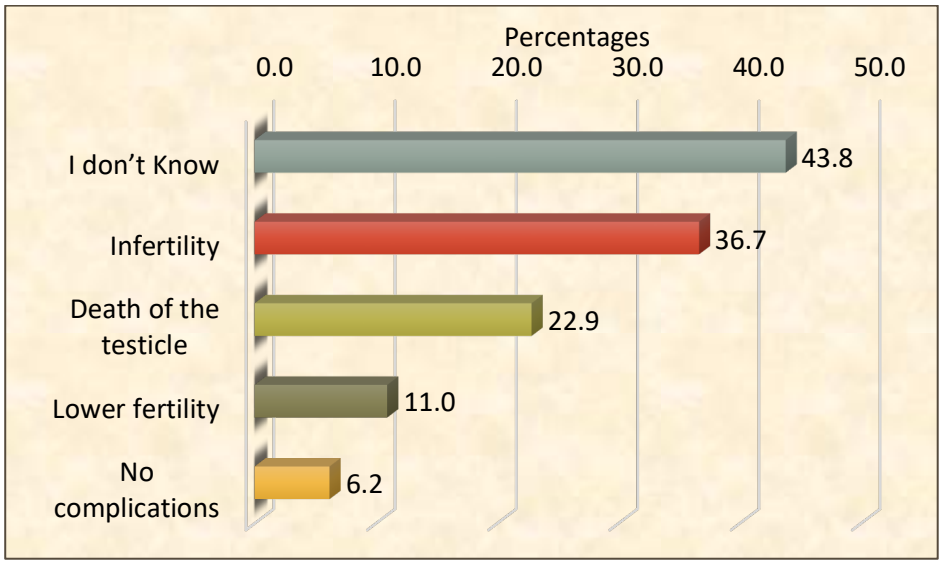

Figure 3: Do you know the complications of testicular torsion?

Table 3: Relationship between parents' knowledge level about testicular torsion and their socio-demographic variables

Variables	Category	Knowledge			Total	Chi-square, P-value
		Poor	Fair	Good		
Age	<=35	119 (70.0%)	18 (60.0%)	6 (60.0%)	143 (68.1%)	1.490, 0.475
	>35	51 (30.0%)	12 (40.0%)	4 (40.0%)	67 (31.9%)	
Gender	Female	113 (66.5%)	13 (43.3%)	3 (30.0%)	129 (61.4%)	10.139, 0.006
	Male	57 (33.5%)	17 (56.7%)	7 (70.0%)	81 (38.6%)	
Nationality	Saudi	157 (92.4%)	29 (96.7%)	8 (80.0%)	194 (92.4%)	2.961, 0.228
	Non-Saudi	13 (7.6%)	1 (3.3%)	2 (20.0%)	16 (7.6%)	
Relation to the child	Mother	60 (35.3%)	10 (33.3%)	2 (20.0%)	72 (34.3%)	2.315, 0.678
	Father	39 (22.9%)	9 (30.0%)	4 (40.0%)	52 (24.8%)	
	Other	71 (41.8%)	11 (36.7%)	4 (40.0%)	86 (41.0%)	
Employment	No	91 (53.5%)	9 (30.0%)	5 (50.0%)	105 (50.0%)	5.647, 0.059
	Yes	79 (46.5%)	21 (70.0%)	5 (50.0%)	105 (50.0%)	
Education Level	Lower than university	40 (23.5%)	3 (10.0%)	1 (10.0%)	44 (21.0%)	3.579, 0.167
	University	130 (76.5%)	27 (90.0%)	9 (90.0%)	166 (79.0%)	
Number of daughters	<=2	108 (63.5%)	19 (63.3%)	6 (60.0%)	133 (63.3%)	0.051, 0.975
	>=3	62 (36.5%)	11 (36.7%)	4 (40.0%)	77 (36.7%)	
Number of sons	<=2	136 (80.0%)	22 (73.3%)	6 (60.0%)	164 (78.1%)	2.672, 0.263
	>=3	34 (20.0%)	8 (26.7%)	4 (40.0%)	46 (21.9%)	

The table presents the distribution of knowledge levels regarding testicular torsion across different demographic variables and the results of the chi-square tests examining the associations between these variables and knowledge levels. Age did not show a significant association with knowledge levels ($\chi2 = 1.490$, $p = 0.475$), with similar proportions of poor, fair, and good knowledge observed among participants aged 35 and below compared to those over 35. However, gender exhibited a significant association with knowledge levels ($\chi2 = 10.139$, $p = 0.006$), with a higher percentage of males demonstrating good knowledge compared to females. Nationality did not establish a significant association with knowledge levels ($\chi2 = 2.961$, $p = 0.228$), indicating similar distributions of knowledge among Saudi and non-Saudi participants. Similarly, the relation to the child did not exhibit a significant association with knowledge levels ($\chi2 = 2.315$, $p = 0.678$), with comparable proportions of poor, fair, and good knowledge observed among mothers, fathers, and other relatives. Employment status showed a marginally significant association with knowledge levels ($\chi2 = 5.647$, $p = 0.059$), with employed participants demonstrating slightly higher levels of knowledge compared to unemployed individuals. Education level did not establish a significant association with knowledge levels ($\chi2 = 3.579$, $p = 0.167$), with similar proportions of poor, fair, and good knowledge observed among participants with lower than university education compared to those with university education. The number of daughters and sons did not show significant associations with knowledge levels ($\chi2 = 0.051$, $p = 0.975$ and $\chi2 = 2.672$, $p = 0.263$, respectively), indicating similar distributions of knowledge across different family compositions. These findings highlight the importance of considering gender differences in educational interventions aimed at improving knowledge of testicular torsion and suggest potential avenues for targeted interventions to enhance awareness and knowledge among specific demographic groups (Table 3, Figure 4).

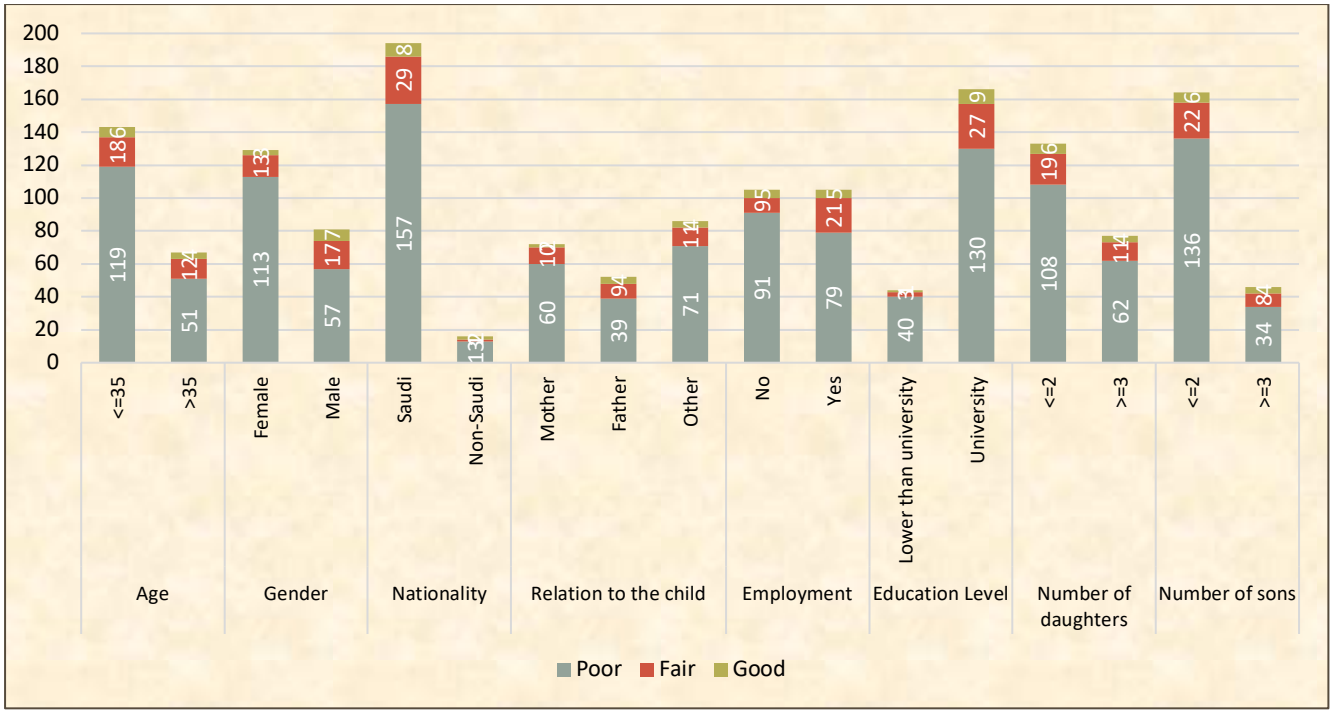

Figure 4: Relationship between parents' knowledge level about testicular torsion and their socio-demographic variables

DISCUSSION

The demographic profile of the participants indicates a diverse distribution across various categories, with the majority falling within the age range of 18-35 years. This demographic composition reflects the inclusion of individuals across different life stages, providing a holistic representation of parental perspectives on testicular torsion. Additionally, the study sample exhibits gender parity, with a slightly higher representation of females. The predominance of Saudi nationals in the sample aligns with the geographic location of the study. It underscores the relevance of the findings within the context of the Kingdom of Saudi Arabia. Furthermore, the varied educational backgrounds and employment statuses of the participants highlight the heterogeneous nature of the study population, encompassing individuals with diverse socioeconomic backgrounds.

The responses provided by the participants offer valuable insights into parental perceptions and knowledge regarding testicular torsion, particularly concerning symptom recognition and appropriate actions in response to scrotal pain in their children. The high percentage of parents expressing readiness to seek immediate medical attention, especially over the weekend, underscores the recognition of the urgency associated with scrotal pain, reflecting a proactive approach to healthcare-seeking behavior. However, despite the acknowledgment of the seriousness of scrotal pain, a notable proportion of parents demonstrated uncertainty regarding the symptoms and risk factors associated with testicular torsion. This highlights potential gaps in parental knowledge and awareness, particularly concerning the epidemiology and clinical manifestations of the condition. The findings suggest a need for targeted educational initiatives aimed at enhancing parental understanding of testicular torsion and promoting timely intervention. Furthermore, the association between demographic variables and knowledge levels provides valuable insights into factors influencing parental awareness of testicular torsion. While age, nationality, and relation to the child did not exhibit significant associations with knowledge levels, gender and employment status showed notable associations. The higher proportion of males demonstrating good knowledge compared to females suggests potential gender disparities in health literacy, emphasizing the importance of tailored educational interventions to address these differences. Similarly, the marginally significant association between employment status and knowledge levels highlights the potential influence of socioeconomic factors on health-related knowledge and attitudes. In a study conducted [7]., it was observed that parents with a high level of knowledge were four times more likely to arrive at the appropriate time. This finding is consistent with our study, where we also discovered a significant correlation between immediate presentation to the emergency room and knowledge about testicular torsion. These results underscore the critical role of knowledge in facilitating timely recognition and management of testicular torsion, ultimately leading

to better outcomes for patients.[8]

In a study conducted [9] the investigation centered on parental awareness of testicular torsion (TT) within urology and ear, nose, throat (ENT) clinics. Their findings revealed a notable similarity in the levels of awareness regarding TT between parents attending both types of clinics, with percentages standing at 34.2% and 35.6%, respectively. Furthermore, Friedman et al[9]. highlighted that 34% of parents had previous knowledge of testicular twisting/torsion, often acquiring this information through informal channels such as acquaintances or individuals with firsthand experience of torsion. Meanwhile, [10] examined the awareness levels among male undergraduates within Nigerian university settings, revealing a relatively lower awareness rate of 28.2% concerning the condition. Moreover, in [9] investigation, it was noted that 65.2% of parents attending urology clinics reported instances of their children experiencing scrotal pain, contrasting starkly with the absence of such complaints among parents attending ENT clinics. These findings closely mirrored the outcomes of our study, wherein a significant proportion of parents, approximately 74.4% during business hours and 81.8% outside business hours or during weekends, indicated their inclination to promptly seek medical attention for their children in cases of scrotal pain.

Conversely, [11] revealed a considerably lower propensity among parents, with only 22% expressing a readiness to bring their children to the emergency room immediately upon experiencing scrotal pain. Additionally, [12] research sheds light on the delayed response among parents, with a substantial 72% indicating a tendency to seek medical assistance after a significant delay, specifically more than 6 hours from the onset of pain. These studies collectively underscore the variations in parental awareness and response patterns concerning testicular torsion, emphasizing the need for targeted educational initiatives to enhance early recognition and appropriate management of this potentially serious condition.[13-15] conducted a study focusing on testicular torsion knowledge, revealing that out of the total 732 participants, 406 individuals (55.5%) exhibited good knowledge, while the remaining 326 participants (44.5%) demonstrated poor knowledge. While there was a higher number of participants with good knowledge, the significant percentage of individuals with poor knowledge raises concerns due to the urgent nature of testicular torsion. This emergency condition necessitates prompt recognition and action to preserve testicular function and improve overall outcomes. Therefore, addressing the gap in knowledge and raising awareness about the signs, symptoms, and immediate actions required for testicular torsion is crucial in enhancing patient outcomes and preventing long-term complications.

Our study's findings offer key insights for clinical practice, particularly in enhancing the timely recognition and management of TT among parents. The age group of participants, mostly under 35 years of age, crosses the entire spectrum of parental views. In fact, many were willing to come to the hospital for the pain in the scrotum right away; yet, as would appear, a sizable number of them remained uncertain about the symptoms and risk factors of TT, indicating inadequate knowledge. All these gaps suggest some need for focused education programs with the aim of enhancing parental knowledge and awareness and, thus, early interventions.

Our study agrees with Yap et al., who found that parents who were more knowledgeable were four times more likely to seek early care[7]. Our observation has also shown that knowledgeable parents tended to take their children earlier to the emergency room[8]. Similar studies by Friedman et al. found that most parents received knowledge of TT informally and, therefore, reinforced the need for formal education [9]. Further research, as in Ubee et al.[11] and El Anzaoui[12], highlighted the above problem area even in delayed medical care, where most parents waited for over six hours before presenting themselves for care. The authors also reported that although over half of the patients were described as having good knowledge about TT, the overall proportion of those with poor knowledge is still significant at 44.5%, which clearly indicates the need for wider awareness [15].

The first limitation of this study was that its cross-sectional design limited the ability to establish causality or temporal relationships between variables. Furthermore, the study did not explore cultural or religious factors that may influence parental attitudes and behaviors regarding seeking medical care for their children. Finally, while efforts were made to ensure anonymity and confidentiality, the study's reliance on survey data may raise concerns about privacy and data security. Despite these limitations, this study contributes to the growing body of literature on testicular torsion awareness and highlights areas for future research and targeted interventions. Overall, the findings underscore the importance of targeted educational interventions aimed at enhancing parental awareness and knowledge of testicular torsion, particularly among vulnerable demographic groups. By addressing gaps in knowledge and promoting proactive healthcare-seeking behaviors, such initiatives have the potential to improve early recognition and management of testicular torsion, ultimately contributing to better health outcomes for

children and adolescents. Selection bias was also likely because only self-reporting volunteers from Al Majmaah Governorate were included, and thus, this may lead to an overrepresentation of better-informed people. Therefore, the study could not generalize the results to other populations very well. Recall bias was also a concern since the participants were relying on memory to report their knowledge and behavior regarding testicular torsion, leading to incorrect responses, affecting, therefore, the reliability of the data. Future studies could focus on striving for more diversified samples and consider methodologies that reduce recall bias through real-time collection of data.

CONCLUSION

The conclusion drawn from this study underscores a concerning deficiency in the general population's awareness and knowledge regarding testicular torsion, a critical urological emergency. Despite efforts to disseminate information and raise awareness, the findings reveal a significant gap in understanding, posing potential risks for delayed diagnosis and treatment. Intriguingly, certain demographic groups, notably younger males, individuals without marital status, those currently employed in the medical field, and those with a personal or family history of testicular torsion, demonstrated a more robust comprehension of the condition. This nuanced insight suggests that targeted educational initiatives may prove effective in enhancing awareness among specific demographic cohorts, potentially mitigating delays in diagnosis and treatment.

However, the pervasive need for more awareness among the broader population necessitates further exploration through longitudinal studies. Longitudinal research endeavors hold promise in providing deeper insights into the evolution of public knowledge regarding testicular torsion over time. By tracking awareness levels and knowledge acquisition longitudinally, researchers can discern trends, identify persistent misconceptions, and evaluate the effectiveness of educational interventions. Such studies are essential for informing future public health strategies aimed at improving awareness and reducing delays in diagnosis and treatment.

Data availability

The data supporting this study's findings are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Institutional Review Board statement

This study was approved by the institutional review board of the Deanship of Scientific Research at Majmaah University with IRB No MUREC-Sep17/COM-2023/28-1. All methods were carried out in accordance with KAIMARC guidelines and the Declaration of Helsinki guidelines.

Informed consent statement

Consent was obtained from the participants before enrollment in the study.

Authors' contributions

Abdulrahman A. Bin Alamir and Maisa Ali Hussein conceptualized the study. Fay Almutairi, Nawaf Hassan Mohammed Alrufaydi, Mohammed Hussain A Alothayqi, Ghania Hameed Alfahmi, Walaa Alhudhudi collected all the data. Abdulrahman A. Bin Alamir and Maisa Ali Hussein analyzed and interpreted the patient data. Abdulrahman A. Bin Alamir and Maisa Ali Hussein did the manuscript write up. All authors reviewed and approved the final version of the manuscript

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