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Burden and seasonality of testicular torsion in tropical Africa: Analysis of incident cases in a Nigerian community

Jibril O. Bello

Department of Surgery, University of Ilorin Teaching Hospital, Ilorin, Nigeria

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KEYWORDS
Testicular torsion;
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Abstract

Introduction: Children, adolescents and young adults in tropical Africa occasionally presents to the emergency department with testicular torsion. However, no estimates of the burden of the condition is available and there is also sparse evidence of a seasonal variation in incidence.

Objective: To determine the incidence and seasonality of the condition in a Nigerian community.

Subjects and methods: A retrospective review of incident cases of testicular torsion occurring in a typical tropical sub-Saharan African community between January 2011 and December 2016 was performed. Incidence rates were calculated and trend analysis performed to evaluate for seasonality.

Results: Twenty-three patients were seen during the study period and the average annual incidence of testicular torsion among 'at risk' males (<40 years) was 2.7/100,000. Testicular salvage rate was 81%. Cases occurred 91% higher than average during the cold season (November to January). Trend analysis revealed a significant seasonal difference in the number of cases seen ($p = 0.045$) and Post Hoc tests (Tukey) further showed that this is attributable to the seasonal difference between the cold season and the warmer early rains period ($p = 0.036$).

Conclusion: The burden of testicular torsion found in the studied tropical sub-Saharan community is comparable to other regions of the world and seasonal variation in incidence does occur with a significant increase in cases during the cold season.

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Introduction

Children, adolescents and young adults in tropical Africa occasionally presents to the emergency department with testicular torsion (TT) [1–7]. However, there are no available estimates of the burden of the condition and the demographic distribution in typical

Abbreviations: TT, testicular torsion.

E-mail address: jabarng@yahoo.com

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tropical African communities is also unknown. While it is generally thought that most TT cases occur during cold weather in the region, the evidence is sparse and weak. The strongest available evidence of seasonality of testicular torsion in the tropical climate of sub-Saharan Africa comes from a 30-year-old study carried out in Zaria, Northern Nigeria which found that incidence increased during the cold harmattan months [1]. This current study evaluated incident cases from a community in North- Central Nigeria and assessed the burden and demographic distribution of testicular torsion; it also determined if a seasonal variation in incidence exists. The study aims to provide insights to contemporary incidence of TT in a typical west African tropical community and evaluates if the tropical weather has an influence on incidence. It is also hoped that evidence from the study could guide health-care policies and strategies aimed at improving outcomes and reducing testicular loss following TT.

Subjects and methods

This study was designed to assess the burden (incidence) and seasonal variation of incidence (using trend analysis) of testicular torsion in a community in tropical sub-Saharan Africa. The medical records of all patients who presented with acute scrotum between January 2011 and December 2016 at a large tertiary care hospital in Ilorin, Nigeria were retrospectively reviewed after clearance from the ethics review committee. The hospital receives a clear majority of medical and surgical cases in this urban area and surrounding communities; and provides services to a population of over 2 million. Only patients with clinical diagnosis of TT and who were subsequently confirmed at surgery or with Doppler ultrasonography were included in this study. All but two patients, who declined treatment, were confirmed at surgery. Three patients with incomplete clinical/surgical and or radiological records were excluded from the study as diagnosis was uncertain. Patients with acute scrotum but who had clinical and or radiological evidence strongly suggestive of epididymitis/epididymorchitis and responded to antibiotic therapy were also excluded. Data retrieved included age, presentation delay (time between onset of symptoms and hospital presentation), testicular side involved, degree of torsion, outcome (testicular salvage or not) and hospital stay. Data on the time of day at onset of symptoms (morning, afternoon, evening/night) and season of the year (hot: February–April; early rains: May–July; late rains: August–October; cold: November–January) were also extracted from the records. This seasonal categorization was extrapolated from the annual climate review of the Nigerian Meteorological Agency [8]. Incidence rates were calculated based on the population of 'at risk' males (<40 years) in Ilorin West Local Government Administrative area (LGA) where all the patients included in this study reside [9]. Variables were summarized with counts (%) and medians (range) as appropriate and the seasonal frequency of cases represented by a line graph. Seasonal indices were calculated for each season to allow for comparison with a 'deseasonalised' average season. Trend analysis was also performed to determine if a seasonal pattern in cases presentation exists. This was carried out by comparing means using One-way ANOVA with Post Hoc tests. Statistical analysis was performed with STATA 14.0 software (Stata Corp, College Station, Texas, USA); statistical significance was set at $p < 0.05$.

Results

A total of 23 patients with TT were seen during the study period. All but two, who declined treatment, had operative care. The median patient age was 22 (range: 13–37) years; about one-third (8, 38.1%) of the patients were children under 18 years. Average annual incidence of TT among defined 'at risk' males was 2.7/100,000 (Table 1). Most patients (16, 69.6%) were students in the local high schools or universities. About three-quarters of the patients (16, 69.6%) had symptom onset in the early morning (3am–10am). The median delay from symptom onset to hospital presentation was 5 h (range 1–22 h) and all had operative intervention within 90 min following presentation. The delay in presentation did not significantly affect testicular salvage (OR = 0.65, 95%CI 0.40–1.07). Both testes were involved evenly (left: 12,52.2%; right: 11,47.8%; $p = 0.877$). Of the 42 orchids operated, 21 (50.0%) orchids were torted and 17 of these were salvaged (had orchiopexy) resulting in a testicular salvage rate of 81.0%; four testes which were lost to gangrene were removed (orchiectomy). Median hospital stay was 1 day (range 1–5 days).

Table 1 Annual incidence of testicular torsion.

Year	Cases (n)	[a]Incidence (per 100,000 at risk population)
2011	5	3.45
2012	4	2.76
2013	4	2.76
2014	3	2.07
2015	3	2.07
2016	4	2.76

[a] Population of 'at risk' men in Ilorin West LGA is 144,976; figures obtained from the 2006 population and housing census of the Federal Republic of Nigeria.

Table 2 Incident cases per season and seasonal indices.

[a]Season	Cases (n)	n%	Seasonal indices
Hot	4	17.39	0.70
Early rains	2	8.70	0.35
Late rains	6	26.09	1.04
Cold	11	47.83	1.91

[a] Hot: February–April; early rains: May–July; late rains: August–October; cold: November–January.

Almost half of the patients (11, 47.8%) were seen during the cold season of November to January. Table 2 shows the frequency of cases in each season; cases occurred 91% higher than average during the cold season (November–January) and about 50% less often than average during the hotter parts of the year (February–July) (Table 2). The seasonal frequency of TT was represented by a line graph and shows a single peak during the cold season (Fig. 1). Trend analysis revealed a significant seasonal difference in the number of cases seen ($p = 0.045$) and Post Hoc tests (Tukey) further showed that this is attributable to the seasonal difference between the cold season and the warmer early rains period ($p = 0.036$).

Discussion

This study revealed an average annual incidence of 2.7 cases of TT per 100,000 males younger than 40 years in the typical tropical sub-Saharan African community studied. This may be the first estimate of TT burden in the sub Saharan region and it is intermediate to the yearly incidence of 3.8 and 1.4 per 100,000 in North and South America, respectively. While this current study refined its estimate by considering population of men ≤40 years as the 'at risk' population; the South American and North American studies

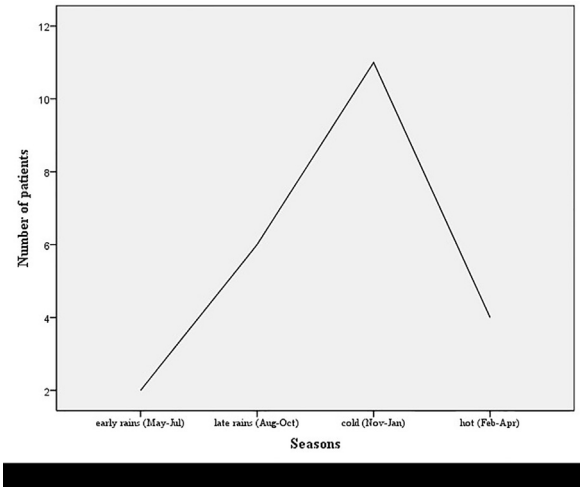

Figure 1 Seasonal frequency of acute testicular torsion. Line graph showing unimodal peak in incident cases during the cold season (November–January). Trend analysis revealed the seasonal difference was significant (p = 0.045) and Post Hoc tests (Tukey) attributed this to the difference between incident cases in cold season and the warmer early rains period (p = 0.036).

used the entire male population and the population of men younger than 18 years respectively to arrive at their estimates. This may have resulted in the varying estimates found in these three studies. Though the median age was 22 years, many confirmed TT cases in the current study were seen in men in their second to fourth decade which is similar to findings from other studies in the region [1–7]. This demographic finding was considered in defining the 'at risk' men population for this study. An important finding of the study was that a third of the cases seen were children and no case of neonatal torsion presented during the study period. This may be due to unrecognized cases, non-presentation or neglected torsion with consequent testicular loss.

Two-thirds of the cases identified were students in local high schools and Universities; most had onset of symptoms at school in hostel dormitories or classrooms and were brought to the hospital by school clinic staff or teachers. This may be responsible for some delayed presentations as there may have been a poor appreciation of the emergency nature of the condition by the patient's peers, teachers and school clinic staff. This finding suggests that secondary prevention strategies through the education of school staff and students on the emergency nature of the condition, the importance of prompt diagnosis and treatment may reduce delayed hospital presentations and prevent testicular loss. All the patients included in this study were operated within 90 min of hospital presentation; while most were operated within an hour, those with longer delays were due to difficulties in obtaining consent for surgery, theatre setup and availability. Despite this, a testicular salvage rate of 81.0% was found in the study which is comparable to average salvage rates of 72% from previous studies in the region [2–6].

A key finding of this study was that TT cases significantly peaked during the cold season with incident cases in the associated months of November to January being 91% higher than average. This confirms observations made in an earlier study conducted in our tropical region which found higher incident cases of TT during similar cold months though this was attributed to the low humidity and not the low temperatures associated with the season [1]. There is conflicting evidence in literature for an association between cold weather and TT from other world regions probably due to the varied climates [1,10–13]. The current study adds to the body of knowledge by identifying and then quantifying the magnitude of the significant seasonal difference found in tropical sub-Saharan region. The study also found on trend analysis that the seasonal significance was due to differences in incident cases occurring in cold season compared to the warmer early rains period. It is thought that a hyperactive cremasteric reflex and consequent testicular retraction which is common during cold weather is responsible for the seasonal increased risk of TT [1,12–13].

This study has some limitations. Though confirmed cases of TT are an important urological emergency, they are relatively infrequent and consequently the study sample is small. Additionally, non-presentation of cases to the hospital is not uncommon in the region due to barriers in accessing health care and this may result in an under-estimation of the burden of the condition. This study adds to current knowledge by providing current estimates of the incidence of TT for the west African region and also provides evidence of a seasonal variation in incidence in the region.

Conclusion

The average yearly incidence of TT in a typical tropical sub-Saharan community was found to be 2.7 cases per 100,000 'at risk' men. Seasonal variations do occur with significant peak in incident cases during the cold season of the tropical climate of Nigeria.

Ethical committee approval

UITH Ethical research committee, NHREC/02/05/2010.

Authors' contributions

JO Bello conceptualized the idea of the study, collected and analyzed the data, and wrote the draft and final manuscript.

Conflict of interest

None.

Source of funding

None.

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