Original Article

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Pathology Section

Prevalence of Testicular and Paratesticular Tumours: A 10-year Retrospective Study

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ABSTRACT

Introduction: Testicular Germ Cell Tumours (TGCTs) seminomas and non-seminomas constitute more than 90% of all type II germ cell tumours and account for only 1% of all the cancers in male worldwide. There is high incidence of testicular tumours in the western world compared to Asian and African countries. TGCTs occur at an early age compared to malignant tumours of other organs. Nonseminomatous germ cell tumours should be distinguished from seminomatous tumours because, the later have higher cure rate. Mesenchymal tumours are more common in paratesticular area.

Aim: To know the prevalence of testicular and paratesticular tumours.

Materials and Methods: This was a retrospective descriptional study done in Department of Pathology, NRI Medical College, Chinakakani, Guntur, Andhra Pradesh, India, over a period of 10 years from January 2010 to December 2019. The data such as age and histopathological diagnosis of testicular and paratesticular tumours were archived from the medical records and from histopathology annals. The results were analysed and presented in the form of percentages.

Results: A total of 26 testicular and paratesticular tumours were identified over 10 years of study period. Out of these cases testicular seminomas were the most common germ cell tumours. The mean age was 35.5 years and 32.1 years for seminomas and for non-seminomatous tumours, respectively. There were two cases of paratesticular rhabdomyosarcomas in paediatric age group and one case of adenomatoid tumour.

Conclusion: The most common testicular tumour in the study was germ cell tumour. Among testicular tumours, seminomas were the most common tumours and among paratesticular tumours, mesenchymal tumours were more common.

Keywords: Germ cell tumour, Malignancy, Seminoma

INTRODUCTION

Testicular Germ Cell Tumours (TGCTs) comprise 1% of all the male cancers worldwide [1]. The incidence of testicular cancer per 100,000 people was equal to 6.7 among the white men, 1.5 among the American black men and 4.9 among the Spanish men. However, the incidence of testicular cancer was much lower in Asia, Africa and Central America than European countries. In Asian countries, the highest standardised incidence rates of testicular cancer were reported in Israel (4.9), Georgia (3.3), Turkey (3.2), Lebanon (2.4), and Kazakhstan (2.4 per 100,000 people) [2]. The established risk factors for TGCTs are family history, previous TGCT, subfertility, undescended testis and testicular microlithiasis in subfertile patients [3]. Intratubular Germ Cell Neoplasia (ITGCN) is the precursor for the development of most of the TGCTs except for yolk sac tumours, mature teratoma and spermatocytic seminoma [4]. ITGCN is characterised by the seminiferous tubules with intact basement membrane and filled by larger cells with hyperchromatic nuclei and prominent nucleoli [4]. Clinically, the diagnosis of testicular tumours is delayed in many cases because of slow growth. Serum tumour markers like Alfa Fetoprotein (AFP), Human Chorionic Gonadotropin (HCG) and Lactate Dehydrogenase (LDH) should be evaluated in all patients before and after orchiectomy and in patients with the metastatic disease before chemotherapy [5]. Seminomas, regardless of clinical stage and stage 1-nonseminomas have cure rates close to 100%. Testicular cancer patients are at increased risk of infertility, so proper counselling should be given to them. TGCTs are partially heritable. The low-penetrance susceptibility allele, gr/gr microdeletion in the AZFc (Azoospermia factor C) region of the Y chromosome, is present in 2-3% of TGCTs and multiplies the risk by 2-3 times, perhaps via its association with infertility [3].

Histogenetically, epithelial, mesothelial and mesenchymal elements form the paratesticular area, so most of the tumours involving the testicular adnexal structures are of mesenchymal origin. According to Khoubehi B et al., 70% of paratesticular tumours are benign and 30% are malignant [6]. The clinical presentation of paratesticular tumours is similar to that of testicular tumours. Testicular and paratesticular tumours are relatively less in incidence compared to other cancers. They constitute 10.5% of all male reproductive cancers in India [7].

As the testicular and paratesticular tumours are relatively uncommon tumours, the need and novelty of the study was to gather these cases, their age of occurrence, prevalence rate and the histopathologic spectrum of these tumours and add this information to the literature.

MATERIALS AND METHODS

The study was a retrospective descriptive study which was done in the Department of Pathology, NRI Medical College, Chinakakani, Guntur, Andhra Pradesh, India over a period of 10 years from January 2010 to December 2019. Histopathology slides of histologically proven testicular and paratesticular tumours were retrieved and reviewed. Study was approved by Institutional Ethical Committee of NRI Medical College with ref no. 143.

Inclusion criteria: Only newly diagnosed tumours of testicular and paratesticular region without prior neoadjuvent chemotherapy were included.

Exclusion criteria: Other non-neoplastic lesions of these sites, extragonadal germ cell tumours and already treated cases were excluded.

Relevant data such as the age of patient, clinical presentation, radiologic findings, serum levels of tumour markers, gross findings like type of orchidectomy, size of the tumour, colour, consistency as well as tumour extension into rete testis or spermatic cord, vascular invasion and relative proportions of each tumour type

in case of mixed germ cell tumours and histologic type of the tumour were collected from the histopathology records and analysed. Immunohistochemical markers such as Placental Alkaline Phosphatase (PLAP), Cytokeratin AE1/AE3 and desmin were used as and when required. The data was analysed as percentages.

STATISTICAL ANALYSIS

The descriptive study was analysed and presented in the form of percentages.

RESULTS

A total of 26 cases of testicular and paratesticular tumours were noted in present study, with an average incidence rate of 2.6% cases per year. The age of the patients ranged from 1 year to 83 years, with the mean age being 33.4 years. Majority of cases (nine cases) were in the age group of 31-40 years comprising to 34.61% [Table/Fig-1]. Most of the patients presented with testicular swelling. Bilateral involvement was not seen in study cases. CNS metastasis was observed in one case. A total of 15 cases (57.69%) of the testicular and paratesticular tumours were right sided, 11 cases (42.31%) were left sided. Out of 26 cases, 23 were testicular and three were paratesticular tumours. All the testicular tumours in present study were germ cell tumours of both seminomas (pure form) and non-seminomatous type including mixed germ cell tumours, mature teratoma and embryonal carcinoma comprising to a total of 23 cases and the most common testicular tumour was seminoma [Table/Fig-2]. None of the cases were associated with ITGCN in this study. Of these 23 cases of testicular tumours included in the study, the histologic spectrum was as follows: 15 cases (57.69%) of seminoma, 5 cases (19.23%) of mixed germ cell tumours, 2 cases (7.69%) of mature teratoma and one case (3.85%) of embryonal carcinoma, respectively [Table/Fig-2].

Age group (years)	n=26	Percentage (%)
1-10	2	7.69%
11-20	2	7.69%
21-30	7	26.92%
31-40	9	34.61%
41-50	3	11.54%
51-60	1	3.85%
61-70	1	3.85%
71-80	0	0
81-90	1	3.85%

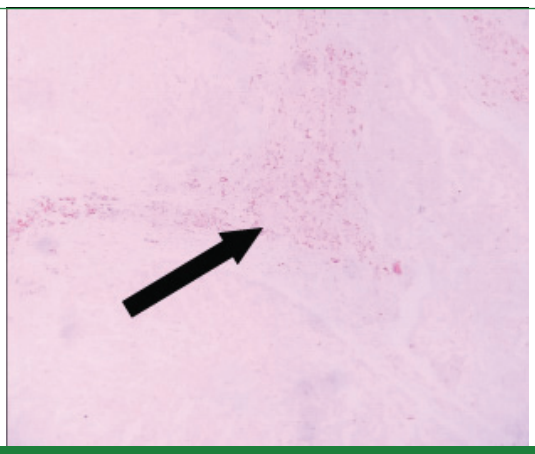
[Table/Fig-1]: Distribution of testicular and paratesticular tumours in relation to age group.

S. no	Histologic type	n=26	Percentage (%)
1.	Seminoma	15	57.69%
2.	Mixed germ cell tumours	5	19.23%
3.	Mature teratoma	2	7.69%
4.	Embryonal carcinoma	1	3.85%
5.	Adenomatoid tumour	1	3.85%
6.	Paratesticular Rhabdomyosarcoma	2	7.69%

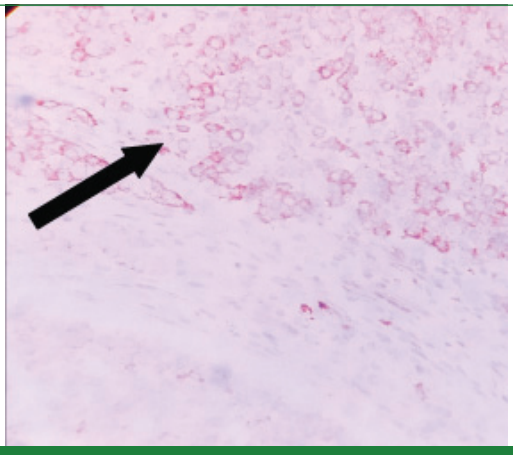
[Table/Fig-2]: Histologic types of various testicular and paratesticular tumours.

Mixed germ cell tumours that were classified under non-seminomatous germ cell tumours of more than one histological type, were the second most common tumours in the study comprising to five cases (19.23%) which included two cases of embryonal carcinoma in combination with yolk sac tumour with 60% of embryonal carcinoma component and 40% of yolk sac tumour component of non-necrotic tumour in both these cases.

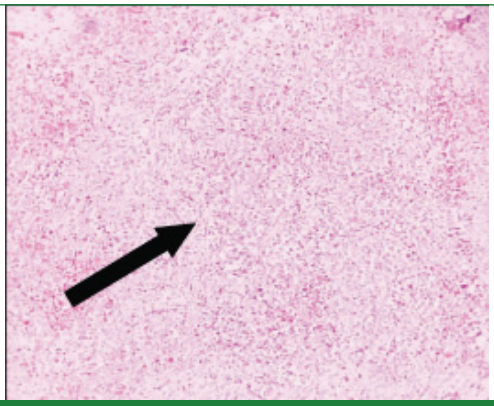
One case of seminoma with embryonal carcinoma (seminoma constituting to 80% of the non-necrotic tumour part and embryonal carcinoma to 20% of the non-necrotic tumour). The case was subjected to IHC markers AE1/AE3 and PLAP for further confirmation



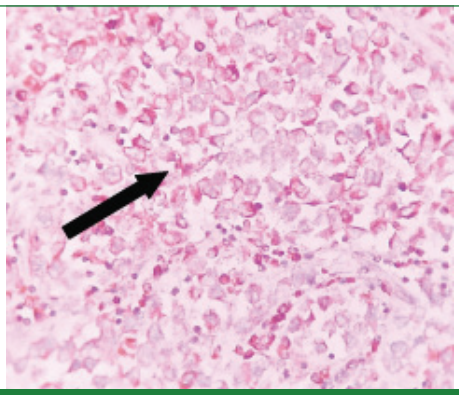
[Table/Fig-3a]: IHC image of PLAP in mixed germ cell tumour with seminoma and embryonal carcinoma showing 55-60% cytoplasmic positivity in embryonal carcinoma component, X100.



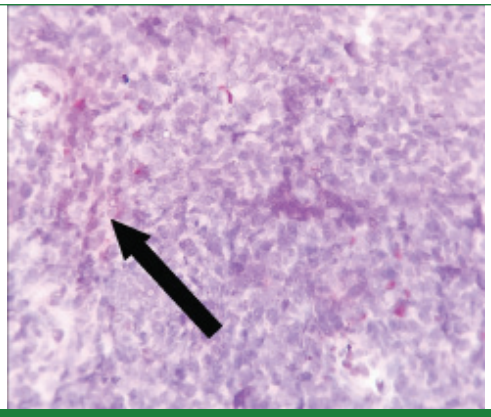
[Table/Fig-3b]: IHC image of PLAP in mixed germ cell tumour with seminoma and embryonal carcinoma showing 55-60% cytoplasmic positivity in embryonal carcinoma component, X400.



[Table/Fig-3c]: IHC image of mixed germ cell tumour with seminoma and embryonal carcinoma, showing 100% cytoplasmic positivity of PLAP in seminomatous component, X100.



[Table/Fig-3d]: IHC image of mixed germ cell tumour with seminoma and embryonal carcinoma, showing 100% cytoplasmic positivity of PLAP in seminomatous component, X400.



[Table/Fig-3e]: IHC image of mixed germ cell tumour with seminoma and embryonal carcinoma, showing AE1/AE3 12-15% of tumour cells in seminomatous component, X400.

and showed 100% cytoplasmic positivity for PLAP with low positivity in 12-15% of tumour cells for AE1/AE3 in seminamatous component is shown in [Table/Fig-3a-e].

One case of teratoma with choriocarcinoma (teratoma constituting to 60% of the non-necrotic tumour part and chorio carcinoma to 40% of the non-necrotic tumour) and one case of immature teratoma with yolk sac tumour (immature teratoma constituting to 30% and yolk sac tumour upto 70% of the non-necrotic tumour) were observed.

The entire data of the cases are presented in [Table/Fig-4]. The mean age for seminomas was 35.5 years and 32.1 years for non-seminomatous tumours. History of cryptorchidism was noted in one case of benign cystic teratoma. Lymphovascular invasion, infiltration of adjacent rete testes, epididymis, tunica albuginea and spermatic cord was identified in two cases, one of which was seminoma and another was a case of mixed germ cell tumour composed of embryonal carcinoma and yolk sac tumour.

Three cases (11.5%) out of the 26 cases included in the study were of paratesticular origin which included two cases of Rhabdomyosarcoma and a single case of paratesticular adenomatoid tumour. Paratesticular rhabdomyosarcoma cases were noted in a one-year-old child and the other in 15-year-old child whereas adenomatoid tumour was reported in a 62-year-old male. The paratesticular rhabdomyosarcoma case that was reported in a one-year-old child at our institution was subjected to IHC at higher centre for the marker desmin and was positive for desmin.

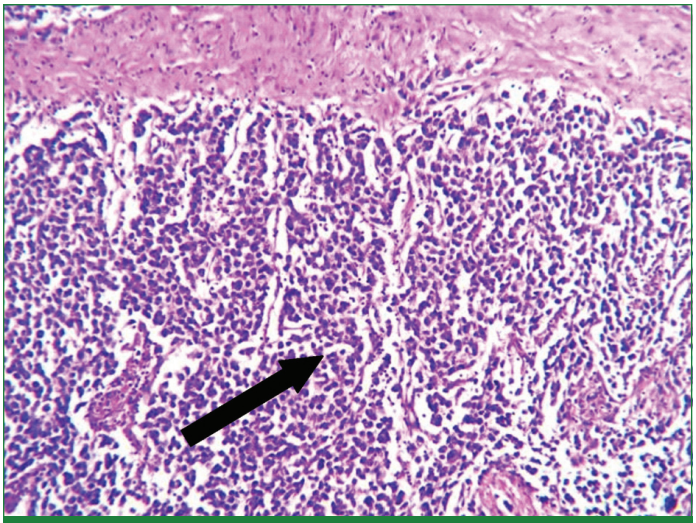
The microscopic pictures of seminoma, embryonal carcinoma, mature teratoma, yolk sac tumour and rhabdomyosarcoma are shown in [Table/Fig-5-10]. No follow-up data of the above cases was included, as most of these cases have approached higher centers for treatment.

DISCUSSION

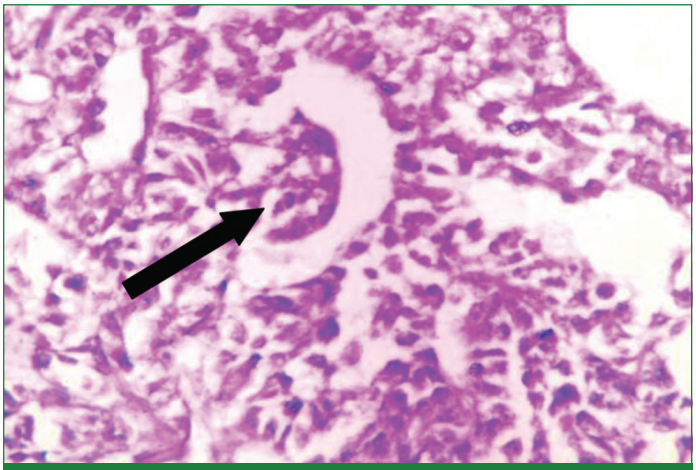
Testicular and paratesticular tumours are a group of heterogeneous neoplasms with distinct biological behaviour, prognosis and with varied histology. Though the incidence of these tumours is low, still it is one of the most common malignancies. The present study which included 26 cases of testicular and paratesticular tumours over a period of 10 years also showed that testicular and paratesticular tumours were rare with an average annual incidence rate of 2.6 cases per year, whereas it was 3.7 cases per year by Chakrabarti P et al., 64.9 cases per year by Howrich A et al., from England and 53.2 cases per year by Walschaerts M et al., from France [8-10]. The most common age group of testicular tumours in present study was 20-40 years similar to Chakrabarti P et al., and Patel MB et al., [8,11]. Testicular tumours were more common on the right side, which is similar to other Indian studies and also African studies [8,11-13]. Right-sided incidence is believed to be as a consequence of the higher prevalence of undescended testes on the right side [14]. There is higher prevalence of paratesticular tumours compared to testicular tumours in African studies [12,13]. One hypothesis for the low incidence of testicular cancer is less consumption of refined food [15]. Although testicular tumours can be derived from any cell type found in the testicles, but more than 95% of testicular tumours arise from germ cells. The hypothesis behind the germ cell tumour is that the disease process begins in foetal life and comprises of abnormal proliferation of primordial germ cells [16,17]. The histologic spectrum of the cases included in the study is as follows. Out of 26 cases included, 23 cases were of testicular origin and 3 cases were of paratesticular origin. These testicular tumours (23 cases) included 15 cases of seminoma and 8 cases of non-seminomatous germ cell tumours. Thus, the most common tumour in present study was testicular seminoma (57.7%) which is a germ cell tumour and was similar to other Indian and African studies [11-13,18] as shown in [Table/Fig-11].

Histologic type	Age in years									No. of cases (%)	Specimen Laterality	
	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	26 cases (100%)	Right	left
Testicular Seminoma			5	6	3	1				15 (57.69%)	7	8
Mixed germ cell tumours										05 (19.23%)		
a) Embryonal carcinoma with yolk sac tumour			1						1	2 (7.692%)	1	1
b) Seminoma with embryonal carcinoma				1						1 (3.846%)	1	-
c) Teratoma with choriocarcinoma			1							1 (3.846%)	1	-
d) Immature teratoma with yolk sac tumour		1								1 (3.846%)	1	-
Non-seminomatous germ cell tumours										3 (11.54%)		
a) Mature teratoma	1			1						2 cases (7.692%)	-	2
b) Embryonal carcinoma				1						1 case (3.846%)	1	-
Paratesticular tumours										3 (11.54%)		
a) Adenomatoid tumour							1			1 case (3.846%)	1	-
b) Paratesticular rhabdomyosarcoma	1	1								2 cases (7.692%)	2	-
Total cases (%)	2 (7.7%)	2 (7.7%)	7 (27%)	9 (34.7%)	3 (11.5%)	1 (3.8%)	1 (3.8%)	-	1 (3.8%)	26 (100%)	15 (57.69%)	11 (42.31%)

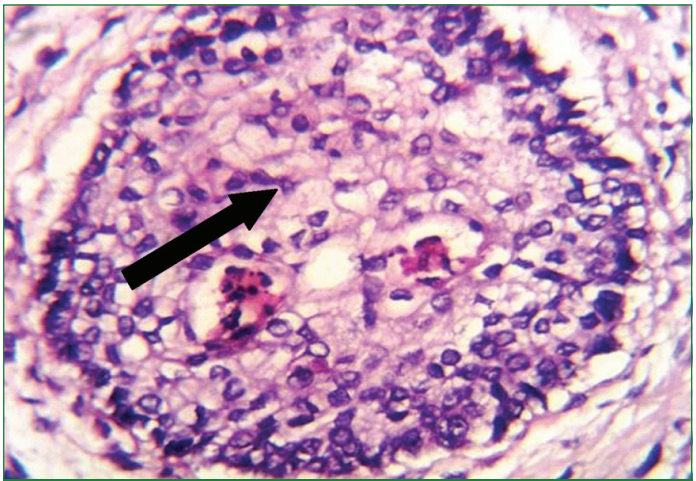
[Table/Fig-4]: Spectrum of histological types, age distribution and laterality of testicular and paratesticular tumours.



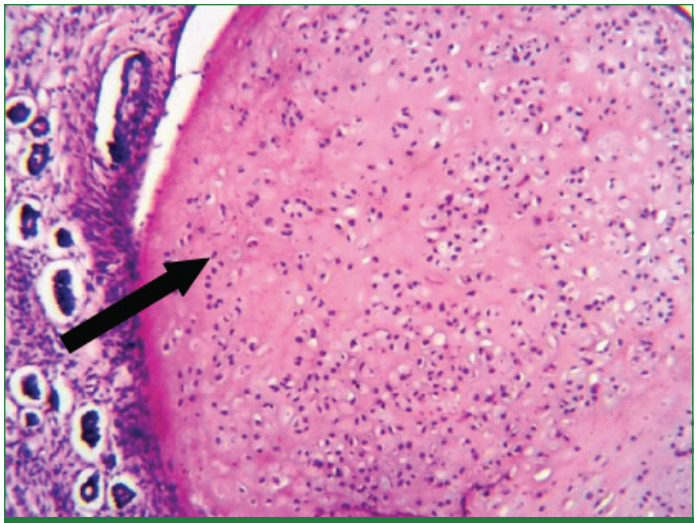
[Table/Fig-5]: Islands of monotonous population of cells separated by fibrous septa -Seminoma X400, H&E.



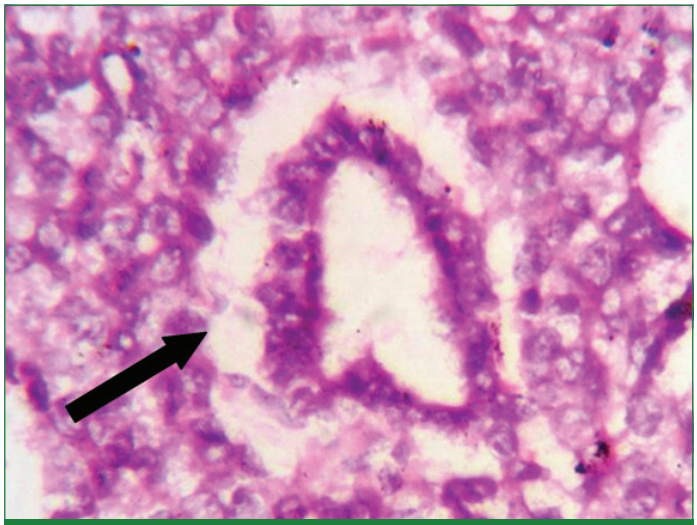
[Table/Fig-6]: Pleomorphic large cells with vague glandular pattern-Embryonal Carcinoma X400, H&E.



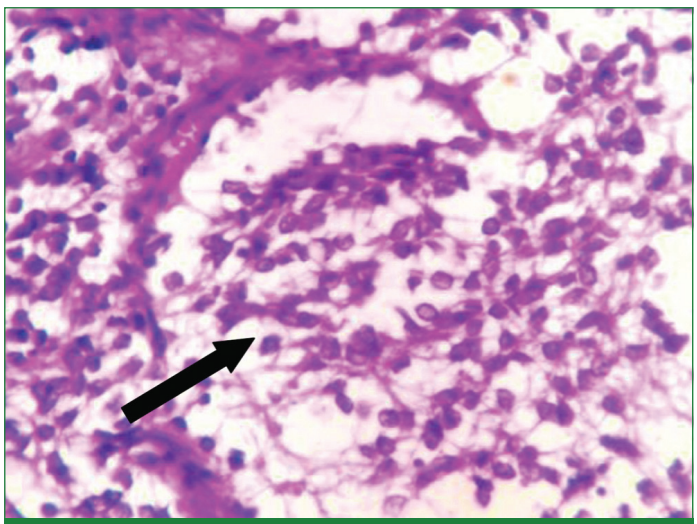
[Table/Fig-7]: Mature teratoma showing adnexal (hair follicular) differentiation X100, H&E.



[Table/Fig-8]: Islands of cartilage a part of mesenchymal component in a case of mature teratoma X100, H&E.



[Table/Fig-9]: Empty space surrounded by tumour cells, Schiller Duval body-yolk sac tumour X400, H&E.



[Table/Fig-10]: Alveolar arrangement of tumour cells-rhabdomyosarcoma X400, H&E.

In the studies done by Patel M et al., and by Salako AA et al., seminomas constituted to 40% and 15.6% of the cases, respectively [11,12]. Seminomas should be scrutinised for small non-seminomatous components. A thorough sampling of grossly different areas, with at least one block per centimetre of diameter is required for larger tumour, so that a mixed component is not missed out. Among non-seminomatous tumours, mixed germ cell tumours were the most common in present study which is similar to Chakrabarti PR et al., (85.8%) [8]. Non-seminomatous tumours occur at younger age compared to seminomas. The mean age of seminomas in present study was 35.5 years and 32.1 years for non-seminomatous tumours. The mean age of seminomas was 37.9 years and 27.5 years for non-seminomatous tumours in a study by Chakrabarti PR et al., [8]. Among the three cases of paratesticular tumours, the most common tumour in present study was rhabdomyosarcomas (two cases) and was similar to the studies done by Salako AA et al., and by Alhaji SA et al., [12,13]. In a study by Chakrabarti PR et al., leiomyosarcomas were the most common paratesticular tumours and is shown in [Table/Fig-12] [8]. In few studies embryonal rhabdomyosarcoma accounted for 70% of cases followed by leiomyosarcoma, liposarcoma and fibroleiomyoma

S. no	Studies	No. of Germ cell tumours reported	No. of Seminoma cases reported	No. of Teratoma cases reported	No. of Embryonal carcinoma cases reported	No. of Yolk sac tumour cases reported	No. of Mixed germ cell tumour cases reported
1.	Present study, 2020 (n=26)	23 (88.46%)	15 (57.7%)	2 (7.7%)	1 (3.8%)	-	5 (19.3%)
2.	Alhaji S et al., [13], 2016 (n=31)	10 (32.2%)	4(12.9%)	2(6.5%)	2(6.5%)	2 (6.5%)	-
3.	Patel MB et al., [11], 2015 (n=15)	13 (86.7%)	6 (40%)	5 (33.3%)	-	1 (6.6%)	1 (6.6%)
4.	Deore KS et al., [18] 2015 (n=17)	12 (70.6%)	4 (23.5%)	-	-	1 (6.67%)	7 (33.3%)
5.	Salako A et al., [12], 2010 (n=26)	8 (30.7%)	4 (15.4%)	1(3.9%)	2 (7.7%)	-	1 (3.9%)

[Table/Fig-11]: Number of germ cell tumours and seminomas compared to other studies [11-13,18].

S. no	Studies	Histologic type
1	Present study, 2020	Rhabdomyosarcoma
2	Chakrabarti PR et al., [8] 2016	Leiomyosarcoma
3	Alhaji S et al., [13] 2016	Adenomatoid tumour
4	Salako A et al., [12] 2010	Embryonal Rhabdomyosarcoma

[Table/Fig-12]: Most common paratesticular tumour compared to other studies [8,12,13].

[8,12]. In the study done by Alhaji SA et al., adenomatoid tumours (27.8%) were the most common paratesticular tumours followed by neurofibroma, embryonal rhabdomyosarcoma, leiomyoma, leiomyosarcoma and Lipoma [13].

Limitation(s)

This study represents the prevalence of testicular and paratesticular tumours in Andhra Pradesh only. Few tumours like sexcord stromal tumours and lymphomas were not found in present study. Since these are slow growing tumours, some of them might not come to medical attention, so the actual prevalence might be more than recorded.

CONCLUSION(S)

It can be concluded that testicular and paratesticular tumours were uncommon in study population with lower incidence rates when compared to other Western studies. Among the varied histopathology of the tumours in the study, seminoma and paratesticular rhabdomyosarcoma were the predominant testicular and para-testicular tumours, respectively. However, long-term follow-up of the cases in correlation with other prognostic markers are recommended as they can help in patient care and for better treatment options.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Mar 09, 2020
- Manual Googling: Jun 13, 2020
- iThenticate Software: Sep 30, 2020 (09%)

ETYMOLOGY: Author Origin

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