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Deciphering the Patterns of Dual Primary Cases Registered at the Hospital-Based Cancer Registry: First Experience from Rural Cancer Center in North India

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Abstract

Objectives The objective is to present the patterns of dual primary malignancies diagnosed at the Pathology Laboratory of Cancer Hospital with the support from hospital-based cancer registry (HBCR), Sangrur, Punjab, India for the years 2018 and 2019.

Methods HBCR abstracts data from electronic medical records. Trained cancer registry staff abstracts cases in standard pro forma. Dual primary was coded as per the International Agency for Research on Cancer rule and was rechecked by the pathologist.

Statistical Analysis Data about multiple primary was entered and documented in an Excel sheet. Time interval was calculated by subtracting the date of diagnosis for second primary and first primary.

Results A total of 6,933 cases were registered, 45 cases are dual primary (26 females, 19 males) of which 64.4% are synchronous and 35.6% metachronous cases. Seventy-nine percent received cancer-directed treatment for synchronous and 87% for metachronous. The most common sites of the primary tumor were breast (33%), head and neck (22.2%), gynecological sites (11%), prostate (9%), esophagus (4%), and remaining

Keywords
- Dual primary
- synchronous
- hospital-based cancer registry
- metachronous

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other tumors (20.8%). Most common sites for second malignancies were gastrointestinal (GI) tract (31%), gynecological sites (18%), head and neck (16%), hematological malignancies (7%), soft tissue sarcoma (4%), breast (2%), and other sites (22%).

Conclusion More than 70% of cases of primary tumors were in breast, head and neck, gynecological, and prostate. Of these, more than 60% of the second malignancy was found in the GI tract, gynecological, and head and neck sites. Around two-thirds of dual tumors are synchronous. Breast cancer cases have higher incidence of second malignancy. Regular follow-up is necessary to assess the survival of the second primary.

Introduction

Globally, the projected cancer burden for the year 2040 is expected to rise from 19.3 million to 28.4 million, as reported by GLOBOCAN 2020.[1,2] Over the last few decades, advancements in cancer diagnostics and treatments have resulted in better early cancer detection and disease management, and eventually, higher survival.[3] With increased numbers of cured patients and long-term survival, the risk of developing multiple primary malignant tumors is increasing.[4] The incidence of dual primary malignancy has not been rare at all.[5,6] Based on an analysis of several studies, the incidence of multiple primary malignant neoplasm (MPMN) was estimated to be 0.73 to 11.7% in the literature with widely disparate prevalence estimates reported.[7] Warren and Gates established the criteria for diagnosing double primary tumors, which were further revised. For MPMN, the diagnostic criteria are as follows: first, all tumors must be malignant as determined by histopathology; second, each must be geographically distinct and unique, with normal mucosa used to distinguish the lesions; and third, the possibility that one is a metastasis of the other must be ruled out.[8–11] MPMN is defined as two or more unrelated primary malignant tumors that originate from different organs and occur in the body at the same time or one after another.[7] If the tumors occur simultaneously or within 6 months of one another then it is accepted as synchronous (sMPMN), and if the interval time is more than 6 months then it is accepted as metachronous (mMPMN).[12] Different factors are associated with an increased risk of developing more than one primary cancer including genetic susceptibility and familial cancer syndromes, environmental and lifestyle exposures (e.g., tobacco, alcohol use), hormonal factors, immune deficiency and infection, carcinogenic effects of prior cancer treatments, and finally, interaction among all of these factors. Diagnosis and treatment for multiple cancers remain a challenge because of variable definitions of multiple primaries, the lack of specific screening guidelines, and the lack of well-established treatment guidelines.[13] MPMNs can be often confusing whether it is recurrence or distant metastasis of primary tumors since both are characterized by new lesions. Metastatic tumors are derived from the primary lesion, with both showing the same pathological characteristics and similar developmental processes and prognosis. In literature, data regarding the occurrence and the outcome of MPMNs from the Indian subcontinent are limited, apart from that the practical implications of the management of patients with multiple primaries are rarely discussed.[14] In a patient with previous cancer history and potentially prior anticancer therapy, it can be difficult to establish the diagnosis of an additional primary and when a patient with two active malignancies is diagnosed at the same time.[13] The challenge is to find an anticancer therapy strategy that covers both cancer types without increased toxicity or relevant pharmacological interactions and negative impact on the overall outcome.

Because of an increased MPMN occurrence, we aimed to evaluate the clinical characteristics, diagnosis, and treatment delivered to MPMN patients retrospectively who registered at our institution in 2 years. In the present study, we aim to study the epidemiological pattern of dual primary malignancies observed in patients. The Homi Bhabha Cancer Hospital (HBCH), Sangrur, Punjab, India is functional since January 2015. The hospital provides holistic diagnostic facilities such as computerized tomography scan, magnetic resonance imaging, ultrasonography, mammography, biochemistry, hematology, tumor marker, histopathology, immunohistochemistry, and cytology. Additionally, the hospital provides surgical, radiotherapy, and medical oncology services based on the treatment protocol provided by Tata Memorial Centre (TMC), Mumbai, Maharashtra, India. The hospital also provides preventive services in Sangrur like early detection of breast, cervix, and oral cancer. This hospital has both population-based and hospital-based cancer registries.[15,16]

Materials and Methods

This is a retrospective collection of data from a hospital-based cancer registry (HBCR) running in the HBCH, Sangrur. The registry records information through the electronic medical record of the hospital. Extensive case abstraction of patients diagnosed with second de novo malignancy was done by trained HBCR staff. The study follows International Agency for Research on Cancer (IARC) rules. All the sociodemographic as well as clinical information such as age at diagnosis of each tumor, sex, whether synchronous or metachronous, site of origin, method of diagnosis, histology, stage at presentation of disease, and treatment, have been recorded in a predesigned pro forma. The primary site and histology were coded using the International Classification

of Diseases for Oncology 3rd Edition (ICD-O3).[17] Abstracted data of cancer cases were regularly entered in the *CanReg5* software designed by IARC, World Health Organization.[18]

Patients with histologically/radiologically proven synchronous or metachronous dual primaries as defined by Warren and Gates criteria, over 2 years (2018 and 2019) were included in the study. The time interval to differentiate between synchronous or metachronous has been taken as 6 months as reported by several authors.[19–21] We have excluded patients without any histological/radiological evidence of each tumor and the patients in whom, the second tumor was suspected to be a metastasis of the first location.[12]

The entered data were checked by the senior staff from the Centre for Cancer Epidemiology–TMC (CCE-TMC) for quality control. Any error observed in the case abstraction was discussed with the clinician and registry staff. Moreover, for the accuracy of the data, CCE-TMC staff randomly checked the data through the TMC server and senior staff visited Sangrur to discuss the errors with concerned staff and made sure that the errors were corrected and reentered carefully into the database. The final data entered was analyzed using the *CanReg5* software and *SPSS* software version 21.0 (IBM, Armonk, New York, United States). The detailed method has been described in our previous research article.[22]

Results

As shown (►**Fig. 1**) over 2 years (2018–2019), 6,933 patients were registered to the HBCH, Sangrur (2,969 in 2018 and 3,964 in 2019). Out of 6,933 registered cases, 5,819 (84%) were diagnosed with malignancy; 2,521 (43%) in 2018 and 3,298 (57%) in 2019. Out of total registered malignant cases, 45 (10 for the year 2018 and 35 for the year 2019) dual primary malignancies were observed which is 0.8% of total malignant cases registered in HBCH, Sangrur during the 2 years. Among 45 dual primary cases, 29 (64.4%) were synchronous (►**Table 1**) and 16 (35.6%) were metachronous (►**Table 2**). It was found that 44.4% of dual primary cases were from district Sangrur followed by Patiala (20%), Ludhiana (11.1%), 4.4% each from Amritsar, Barnala, Fatehgarh Sahib, and Mansa, and 6.6% cumulatively (2.2% each) from Bathinda, Fazilka, and Kaithal districts.

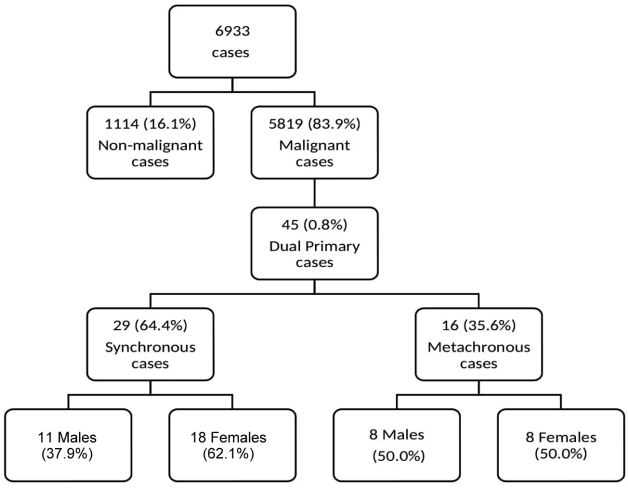

Fig. 1 Flowchart of distribution of cases identified in hospital-based cancer registry (HBCR).

Of the 45 cases, 26 (57.8%) were females and 19 (42.2%) were male cases. The median age for both synchronous was 59 and metachronous malignancies were 57. The most common site of the primary tumor (►**Fig. 2**) was breast (15 cases; 33.3%) followed by head and neck (H&N) cancer (10 cases; 22.2%), gynecological cancer (5 cases; 11.1%), prostate cancer (4 cases; 8.9%), esophagus cancer (2 cases; 4.4%), and other sites (9 cases; 20.0%) which are also in the top leading sites in males and females in HBCR.[22]

The most common site for second malignancy (►**Fig. 3**) was the gastrointestinal tract (GI tract) (14 cases; 31.1%) followed by gynecological cancer (8 cases; 17.8%), H&N (7 cases 15.6%), hematological (3 cases; 6.7%), soft tissue sarcoma (STS) (2 cases; 4.4%), breast (1 case; 2.2%), and other sites (10 cases; 22.2%). The minimum and maximum age of diagnosis for the second primary was found to be 36 and 79 years, respectively. The average age difference between primary and second malignancies was found to be 4.7 years in metachronous cases.

It was also observed that out of 15 primary breast cancers, the second tumor was developed in 5 cases of gynecological sites followed by GI tract (5 cases), STS (2 cases), urinary tract (2 cases), and H&N (1 case). Out of 10 primary H&N cases, 3 occurred in H&N for second malignant neoplasm, 2 in the bladder, 1 in the urinary tract, 2 in the esophagus, 1 in the GI tract, and 1 in the lymphatic system. Out of 5 primary gynecological cases, 1 presented in the gynecological region as a second malignancy, 1 in the breast, 1 in the lung, 1 in the gallbladder, and 1 in the lymphatic system. In the same manner, out of 4 primary prostate cancers, a second malignancy appeared in the GI tract (2 cases), hematological cancers (1 case), and bladder (1 case). Similarly, out of 2 primary esophagus cancer cases, 1 case presented in gynecological sites, and another one was found in H&N as a second malignancy.

Out of 29 synchronous dual primaries, 23 cases (79.3%) received cancer-directed treatment (CDT) for the first malignancy while 22 cases (75.9%) got treated for the second primary at HBCH, Sangrur. Overall, 20 (68.9%) patients received the treatment for both synchronous malignancies. It is observed that, out of 20 treated cases, 9 (45%) were from Sangrur, 3 (15%) from Patiala, 2 (10%) from Mansa, 2 (10%) from Barnala, and 4 (20%) were from other districts which are situated more than 80 km from HBCH. On the other hand, out of 16 metachronous cases, 14 (87.5%) patients have received CDT for primary (10 treated outside of HBCH and 4 treated at HBCH) and 9 patients received treatment at HBCH for the second primary. Out of 9 treated cases, 4 (44.4%) were from Sangrur, 2 (22.2%) from Patiala, and 3 (33.3%) were from other districts which are situated more than 80 km from HBCH.

Table 1 Summary of synchronous dual primary malignancies

Age at primary/ Sex	Primary	Histology	Treatment	Second site	Age at second malignancy	Histology	Time interval (in months)	Treatment	District
70/F	Breast	IDC	Surgery + CT	Liver	70	HCC	0.6	Surgery	Sangrur
49/F	Breast	IDC	Surgery + CT + RT	Kidney	49	Clear cell carcinoma	1.5	Surgery	Fatehgarh Sahib
52/F	Breast	IDC	Surgery + Ct + RT	Jejunum	52	Carcinoid tumor	4.9	Surgery + CT + RT	Sangrur
51/F	Breast	IDC	Surgery + CT + RT	Thyroid	51	Papillary carcinoma	1.5	Surgery	Ludhiana
36/F	Breast	IDC	CT	Rectum	37	Adenocarcinoma	4.2	CT + RT	Mansa
62/F	Breast	IDC	Surgery + CT	Gallbladder	62	Adenocarcinoma	0.06	Surgery	Sangrur
49/F	Breast	IDC	Surgery + CT	Ovary	49	Serous adenocarcinoma	2.9	Surgery + CT	Sangrur
48/F	Breast	IDC	Surgery + CT + RT	Kidney	49	Renal cell carcinoma	3.6	Surgery	Sangrur
56/F	Breast	IDC	Surgery + CT + RT	Stomach	56	GIST	0.3	Observe	Ludhiana
66/M	Hypopharynx	Basaloid SCC	Not treated at HBCH (treated outside)	Esophagus	66	Adenocarcinoma	2	Not treated at HBCH (treated outside)	Sangrur
41/F	Hypopharynx	SCC	CT + RT	Kidney	41	Clear cell carcinoma	2.9	Not treated at HBCH	Sangrur
59/M	Larynx	SCC	CT + RT	Floor of mouth	59	SCC	0	CT + RT	Mansa
38/M	Larynx	SCC	CT + RT	Bladder	38	Papillary transitional cell carcinoma	2	CT + RT	Barnala
51/M	Larynx	SCC	RT	Esophagus	51	SCC	0.2	CT + RT	Ludhiana
77/M	Oropharynx	SCC	RT	Hypopharynx	77	SCC	0.9	RT	Patiala
64/M	Thyroid	Medullary carcinoma	Treatment advised not taken	Bladder	64	Papillary transitional cell carcinoma	1.3	CT	Fatehgarh Sahib
68/M	Tongue	SCC	Treatment advised not taken	Thyroid	68	Papillary carcinoma	1.7	Treatment advised not taken	Sangrur
64/F	Tongue	SCC	Not treated at HBCH (treated outside)	Lymph node	64	Small lymphocytic lymphoma	1.1	Not treated at HBCH (patient defaulted)	Patiala
51/F	Cervix	SCC, keratinizing	CT + RT	Lymph node	51	NHL-DLBCL	1.3	CT + RT	Sangrur
65/F	Ovary	Serous adenocarcinoma	Not treated at HBCH (patient defaulted)	Breast	65	IDC	0.2	Not treated at HBCH (patient defaulted)	Sangrur
73/F	Ovary	Serous adenocarcinoma	Not treated at HBCH (treated outside)	Lung	73	Adenocarcinoma	0.9	CT	Patiala
76/F	Ovary	Serous adenocarcinoma	Surgery + CT	Gallbladder	77	Adenocarcinoma	3.5	Surgery	Sangrur
70/M	Prostate	Adenocarcinoma	CT	Bone marrow	70	Polycythemia vera	3.2	Not treated at HBCH	Patiala
41/F	Esophagus	Neoplasm Malignant	CT	Cervix	41	SCC, non-keratinizing	3.6	CT + RT	Sangrur
64/F	Esophagus	SCC	CT + RT	Oropharynx	64	SCC	0	CT + RT	Patiala
58/M	Bladder	Transitional cell carcinoma	CT + RT	Lung	58	SCC	1.5	CT + RT	Sangrur
70/F	Anal canal	SCC	RT	Cervix	70	SCC, non-keratinizing	0.7	RT	Barnala
58/M	Rectum	Signet ring cell carcinoma	CT + RT	Prostate	58	Adenocarcinoma	2.5	CT	Patiala
74/M	Lymph node	NHL-DLBCL	CT	Tongue	74	SCC	0	CT	Amritsar

Abbreviations: CT, chemotherapy; F, female; GIST, gastrointestinal stromal tumor; HBCH, Homi Bhabha Cancer Hospital; HCC, hepatocellular carcinoma; IDC, infiltrated duct carcinoma; M, male; NHL-DLBCL, non-Hodgkin-lymphoma diffuse large B-cell; RT, radiotherapy; SCC, squamous cell carcinoma.

Table 2 Summary of metachronous dual primary malignancies

Age at primary/ Sex	Primary	Histology	Treatment	Second site	Age at second malignancy	Histology	Time interval (in years)	Treatment	District
65/F	Breast	IDC	Surgery	Soft tissue	68	Fibrosarcoma	3	Surgery	Sangrur
51/F	Breast	IDC	Surgery + CT + RT (treated outside)	Ovary	60	Serous adenocarcinoma	9	CT + RT	Amritsar
51/F	Breast	Neoplasm malignant	Surgery (treated outside)	Ovary	58	Serous adenocarcinoma	7	Surgery + CT	Ludhiana
50/F	Breast	Neoplasm malignant	Surgery + CT (treated outside)	Endometrium	58	Endometrioid adenocarcinoma	8	Not treated at HBCH (patient defaulted)	Bathinda
29/F	Breast	Neoplasm malignant	Surgery + HT (treated outside) + RT (at HBCH)	Ovary	36	Neuroendocrine carcinoma	7	CT (outside) + RT (at HBCH)	Sangrur
69/F	Breast	Neoplasm malignant	BSC	Soft tissue	76	Angiomyosarcoma	7	BSC	Fazilka
54/F	Cervix	Neoplasm malignant	CT + RT (treated outside)	Ovary	65	Serous adenocarcinoma	11	CT + RT	Sangrur
60/M	Prostate	Adenocarcinoma	Surgery + HT (treated outside)	Anal canal	64	SCC	4	CT + RT	Ludhiana
78/M	Prostate	Adenocarcinoma	HT + RT	Gallbladder	79	Adenocarcinoma	1	BSC	Sangrur
61/M	Bladder	Neoplasm malignant	Surgery (treated outside)	Bone marrow	73	Chronic lymphocytic leukemia	12	Under observation at HBCH	Sangrur
71/M	Kidney	Neoplasm malignant	Surgery (treated outside)	Bone marrow	71	Multiple myeloma	0.75	Treatment advised not taken	Patiala
46/F	Rectum	Adenocarcinoma	Surgery (treated outside) + CT + RT (at HBCH)	Thyroid	49	Papillary microcarcinoma	3	Surgery	Sangrur
51/M	Ampulla of Vater	Adenocarcinoma	Surgery + CT + RT (treated outside)	Colon	52	Adenocarcinoma	1	Surgery	Patiala
62/M	Retromolar area	SCC	Surgery	Liver	63	Neoplasm malignant	7.1	No treatment	Sangrur
62/M	Prostate	Neoplasm malignant	Not treated at HBCH (patient defaulted)	Bladder	62	Neoplasm malignant	8	Not treated at HBCH (patient defaulted)	Kaithal
53/M	Brain	Glioblastoma	Surgery + CT + RT	Prostate	55	Adenocarcinoma	1.2	CT	Patiala

Abbreviations: BSC, best supportive care; CT, chemotherapy; F, female; HBCH, Homi Bhabha Cancer Hospital; HT, hormone therapy; IDC, infiltrated duct carcinoma; M, male; RT, radiotherapy; SCC, squamous cell carcinoma.

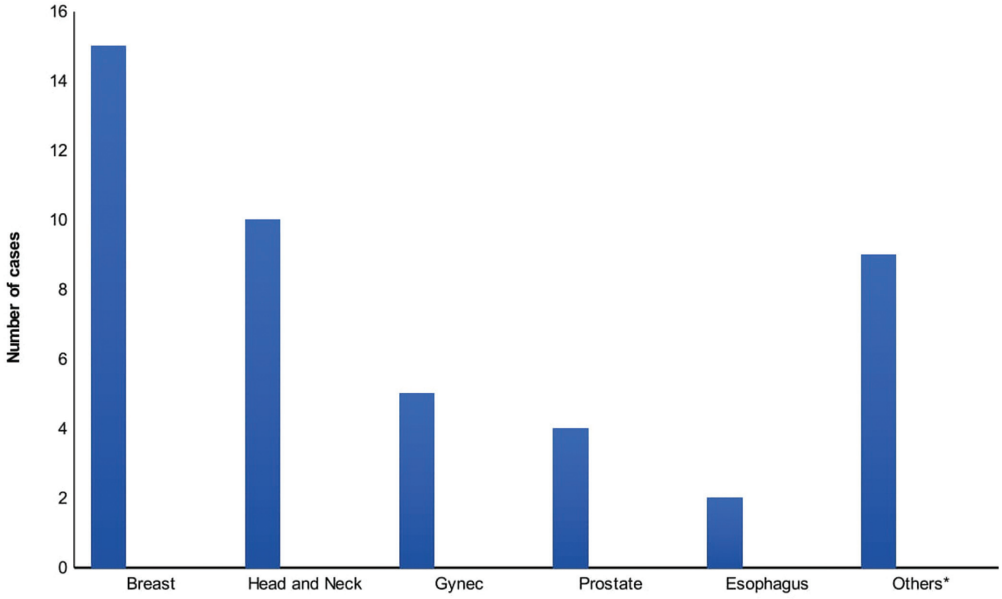

Fig. 2 Site distribution of primary malignancies.

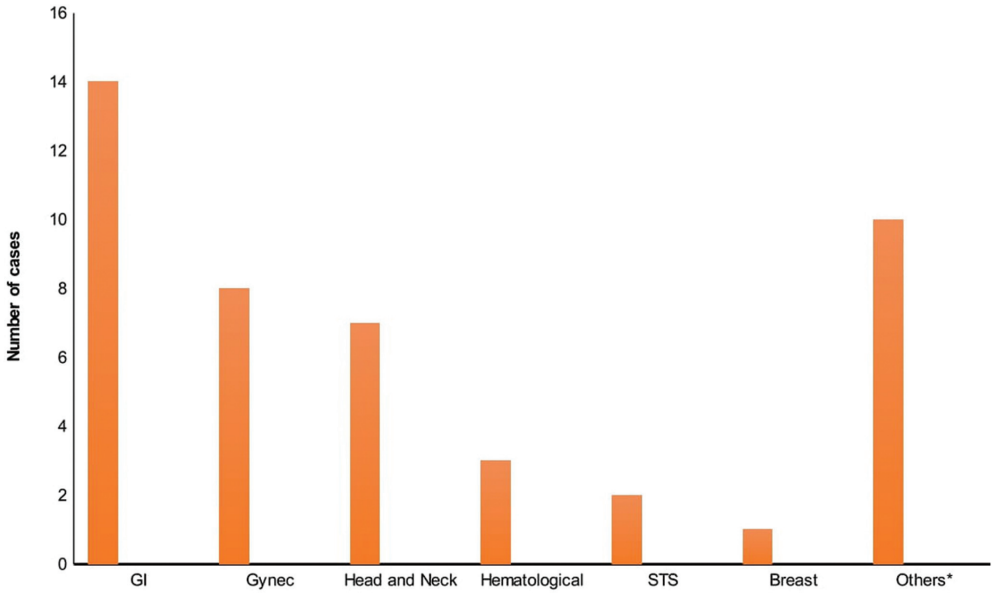

Fig. 3 Site distribution of second malignancies.

Discussion

For the first time, data have been presented on dual primary cases from a rural tertiary cancer hospital in Punjab, from North India which is a unit of TMC in Mumbai, India. HBCH Sangrur has a competent diagnostic and treatment infrastructure that is accessible and provides benefits of various financial support schemes by the state and central government.[23] Among the total cancer patients who were registered to the HBCH, Sangrur in 2018 and 2019, the female-to-male ratio was 1.19:1, while the female-to-male ratio for double primary malignancies was found to be 1.37:1 which is in good agreement with the female patients registered to the hospital. These data results are following the study results about breast cancer among females indicating they have a slightly higher chance to develop a second malignant neoplasm.[24] Although the mechanisms underlying the emergence of MPMNs have not been fully explained, among the most common factors that have been implicated are genetic predisposition, the immune system of patients, and extensive exposure to carcinogens, which include chemo- and/or radiotherapy used in tumor treatment.[12] However BRCA1 and BRCA2 mutations as well as obesity may be responsible for the higher number of dual primary breast malignancies.[25]

Table 3 Comparison of studies with literature describing various characteristics of dual primary cases

Studies	Study period (in y)	Number of cases	Male	Female	No. of synchronous cases	No. of metachronous cases	Major primary malignancies (%)	Major second malignancies (%)	Mean time interval between metachronous cases (in y)	Median/ Mean* age at primary malignancy (in y)
Suzuki et al [19]	26	108	86	22	18	90	H&N (61.0%)	GI (49)	**5**	63*
Cheng et al [20]	10	129	58	71	43	86	GI cases only	Breast (7.7%), gynecologic (31.0%), GU (7.7%)	8.1	60*
Irimie et al[5]	3.4	63	29	34	22	41	Breast (14.3%), gynecologic (19.0%), prostate (6.3%)	Breast (20%), gynecologic (9.5%), GI (16.5%)	2.9	53*
Hulikal et al[6]	5	38	17	21	13	25	Breast (23.0%), H&N (55.0%), gynecologic (7.8%)	GI (18.4%), H&N (44.0%)	6.4	51
Bagri et al[12]	4	41	16	25	8	33	Breast (17.0%), H&N (34.0%), gynecologic (21.9%)	Breast (21.9%), GI (21.9%), H & N (12.0%)	**5.08**	48
Amer[4]	8	322	147	175	47	275	**Breast (29.2)**, prostate (14.9%), GU (23.0%), GI (9.0%)	Breast (18.3%), GI (11.5%), prostate (6.5%)	6.4	60*
Kim and Song[26]	14	108	1	107	0	108	Breast cases only	Thyroid (41.7%), gynecologic (15.8%), GI (14.8%)	**5**	56
Sharma et al[27]	5	38	17	21	10	28	**Breast (28.9%)**, H&N (26.3%), gynecologic (13.0%)	Breast (23.6%), GI (10.5%), H&N (34%)	**5.5**	52
Tanjak et al[28]	25	1,785	792	993	520	1,265	Breast (23.0%), H&N (12.2%), GI (26.2%)	Breast (18.3%), H&N (11.8%), GI (29.7%)	1.5	60*
Dutta et al[29]	11	41	24	17	19	22	Breast (12.0%), H&N (38.0%), GI (13.0%)	Breast (9.7%), GI (17.0%), H&N (34.0%)	7.4	55
Present study	**2**	**45**	**19**	**26**	**29**	**16**	**Breast (33.3%), H&N (22.2%), gynecologic (11.1%)**	**GI (31.1%), gynecologic (17.8%), H&N (15.6%)**	**4.7**	59

Abbreviations: GI, gastrointestinal; GU, genitourinary; H&N, head and neck.
* Indicate the mean age at the diagnosis of primary malignancy.

Similarly, patient with H&N squamous cell carcinoma (HNSCC) are at elevated risk of second primary malignancies, most commonly of the H&N, lung, and esophagus and it may be due to association of human papilloma virus H&N sites like oropharyngeal cancers.[21]

Our results are in good agreement with the average time duration which is around 5 years to develop a second malignant neoplasm as reported by Kim and Song.[26] Similar results were reported by some past studies carried out by Bagri et al, Suzuki et al, and Sharma et al.[12,19,27] A study conducted in a European cohort shows women surviving breast cancer have a 30% increased risk of developing endometrial, colorectal, lymphoma, melanoma, and kidney cancers which are best reflected in primary breast cancer cases as reported by us as 33% second malignancy were found in gynecological sites and 33% in GI tract.[28–30] A comparison of various epidemiological factors related to dual primary cases in recent studies conducted has been presented in ►**Table 3**.

Patients with HNSCC have known for a 36% incidence of second primary malignancy over 20 years.[21] This has been attributed to field carcinogenesis related to exposure to common risk factors like tobacco chewing, smoking, and alcohol consumption.[21,31] In our study, it is also found that H&N cancers were the most common groups to develop a new primary (10 in 45 cases; 22%) after breast primary.

Most of the synchronous dual primary malignancies were diagnosed incidentally for second tumors in our study. When such tumors are incidentally detected they should not be dismissed as metastatic diseases. Any unusual site of metastasis should be thoroughly evaluated to rule out the rare possibility of a second primary.[6]

The possibility of multiple primary malignancies should always be considered during the treatment and follow-up of cancer patients, especially those having a strong family history of cancer. Due to the potential for long-term survival when treated at early stage, more aggressive treatment may be warranted by the multidisciplinary treating oncologist team.[4] There is a high chance of multiple primary occurrence when treating the primary of the H&N and breast cancer belonging to young age and early stage. While treating the patient, the oncologist should inform the patient about the chances of multiple primary occurrences and consult the oncologist if symptoms occur. The patient should be advised a genetic counseling for the same.

As per our results on the average time for a second malignancy event, we can suggest that patients and clinicians should be aware of such occurrences that could later emerge and be ready for early diagnosis and better management of the disease for improved quality of life of the patients. This is possible when follow-up appointments are scheduled at regular intervals, patients are aware of the need for follow-up and do not avoid/miss follow-up appointments, and the treatment center has state-of-the-art facilities. As the years increase for the follow-up, there is a chance to develop a second primary. If HBCR and population-based cancer registry are located in the same geographical area then cancer registry staff should regularly follow-up on dual primary cases and encourage them to visit the hospital for follow-up and to get treated in the hospital. If the hospital is nearby to the patients who were diagnosed with multiple primaries then they can get treated effectively. We also recommend that the cancer hospital/center should develop an infrastructure that provides early detection of second tumors. The data obtained from hospital cancer registries on dual malignancies may provide in-depth information about the patient so the treating oncologist may plan some pre-assumed investigations in view of the risk of the development of second malignancy and essential interventions may be taken for the treatment of such type of cases at the earliest.

Conclusion

More than 70% of cases of primary tumors were in the breast, H&N, gynecological, and prostate. Of the above primary, more than 60% of the second malignancy was found in the GI tract, gynecological, and H&N sites. Around two-thirds of dual tumors are synchronous. Breast cancer cases have a higher incidence of second malignancy. We need to regularly follow-up on these cases to assess the survival of the second primary.

Authors' Contributions

S.S.: Conceptualization, methodology, pathology inputs, writing the original draft.

A.K.G.: Conceptualization, clinical inputs, assistance in writing the draft.

A.S.: Conceptualization, clinical inputs, assistance in writing the draft.

K.S.C.: Data collection, data quality control, data abstraction, assistance in writing the draft.

K.A.: Data collection, data quality control, data abstraction, assistance in writing the draft.

D.C.: Conceptualization, clinical inputs, assistance in writing the draft.

T.D.: Conceptualization, clinical inputs, assistance in writing the draft.

S.T.: Conceptualization, clinical inputs, assistance in writing the draft.

P.K.: Data collection, data quality control, data abstraction, assistance in writing the draft.

P.J.: Data collection, data quality control, data abstraction, assistance in writing the draft.

A.S.: Conceptualization, pathological inputs, assistance in writing draft.

R.S.B.: Radiologist, assistance in writing the draft.

A.B.: Conceptualization, methodology, data analysis, overall supervision, writing the original draft.

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J.V.D.: Conceptualization, clinical inputs, assistance in writing the draft, overall supervision.

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Conflict of Interest
None declared.

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