

A study of correlation between advance gastric cancer with Conventional Upper Gastrointestinal Endoscopy and Multi detector Computerized Tomography

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Abstract:

Aim and Background: In this current study was to investigate the correlation between advance gastric cancer with Conventional Upper Gastrointestinal Endoscopy (UGI) and Multidetector Computerized Tomography (MDCT). Gastric cancer being a multifactorial disease is the second most common cause of cancer related death in the world; therefore it is important to have detailed understanding of several factors. In this study it was found that though Conventional UGI Endoscopy has significant role in screening the patients or to say diagnosing intra luminal gastric growth, ulcer and the mucosal surface but it lacks the ability to diagnose the pathologies in luminal wall and extra luminal extent of the lesion. It does not have the capability to comment on infiltration, lymph nodes involvement and distant metastasis. MDCT has significant role in diagnosing gastric cancer. **Materials and Methods:** This is a descriptive study using diagnostic tests such as Conventional UGI Endoscopy and MDCT, which was conducted in Meenakshi Medical College Hospital & Research Institute for a period of one and half years. In this study 50 individuals were evaluated for gastric cancer using Conventional UGI Endoscopy and MDCT, findings of which were further correlated with HPE. **Results:** This is a descriptive study using diagnostic tests such as Conventional UGI Endoscopy and MDCT, which was conducted in Meenakshi Medical College Hospital & Research Institute for a period of one and half years. In this study 50 individuals were evaluated for gastric cancer using Conventional UGI Endoscopy and MDCT, findings of which were further correlated with HPE. **Conclusion:** In the present study we conclude that the Conventional UGI endoscopy is a better modality for primary screening of the gastric cancer and aids in diagnosing the premalignant conditions and being a low cost modality is another beneficial factor. MDCT is a superior modality in diagnosing advanced gastric cancer, it provides detailed imaging description leading to better staging of the disease, hence a step forward towards better treatment.

Keywords: Conventional Upper Gastrointestinal Endoscopy, Multidetector Computerized Tomography, Gastric cancer

INTRODUCTION

Gastric cancer is the fourth most common cancer worldwide and the second most common cause of cancer-related death. Detection of early gastric cancer makes survival highly favorable. However patients mostly presents at later stages due to non-specific symptoms of gastric malignancy. Nevertheless, it remains a deadly disease, with over all 5-year survival rates of less than 20%. The early detection and accurate pre-op staging are very important as these patients would be ideal candidates for laparoscopic or minimal invasive surgery[1,2]. Gastric cancer is a multifactorial disease where various genetic, epigenetic and environmental factors may interact in the prognosis of the carcinogenic progression [3].

Gastric carcinoma has striking geographic variations with the highest incidences reported in Japan, Chile, Finland, Poland and Iceland. This suggests that

environment factors have a major role in development of gastric cancer. Dietary habits may be particularly important in the reported geographic differences in cancer risks.

Earlier attention was focused on diagnosis of gastric malignancy by double contrast barium studies, which in earlier days was found to be a very useful modality. Then the focus was shifted to Upper GI Endoscopy for early detection of gastric cancer, which was found useful in detecting suspicious lesions and multi – sample biopsy were taken from different sites to aid in evaluating the nature of lesion. With recent advance in imaging and easily availability of Multidetector CT its one of the preferred imaging modality in diagnosis of gastric cancer, it's also helpful in detecting adjacent infiltration and metastasis. Multi detector CT provides detailed images with Multiplanar reformation. Hence, better anatomical description of the site and extension of the lesion within the lumen as well as beyond the

lumen. Multidetector CT is very useful specially to surgeons for pre-op staging and better demonstration of the lesions by MPR[2].

Gastric cancer in current period can be down staged preoperatively with neoadjuvant chemotherapy to allow for curative surgical resection with improved progression-free and overall survival. Assessment of response is currently performed with MDCT and/or FDG-PET/CT in several higher institutions and health care setup[4].

Gastric cancer has significant impact over the current population in India the country which is well known for its diversity and as stated in previous studies that this particular disease is multifactorial with gross geographical variation. Hence, in the recent times there is need for detailed studies at several institutions in different geographical places to assess the specific risk factors influencing the particular population leading to gastric cancer.

There are several modalities to diagnose gastric cancer like conventional UGI Endoscopy, EUS, MDCT, Virtual Fibroscopy, MRI, PET Scan, but in this study our focus has been on the modalities which are cheaper and easily available in remote areas as Indian healthcare is still growing and most of the districts do not have advanced diagnostic modalities [5].

The modalities used in this study are Conventional UGI Endoscopy and Multidetector CT, findings of which were compared with histopathological examination which is considered as gold standard for diagnosing malignancy.

In this study we have evaluated specific risk factors influencing gastric cancer and for any significant associations between them and the type of appearance of gastric cancer in histological examination, as there is not enough information available regarding this association.

In this study we have evaluated and compared the role of Conventional UGI Endoscopy and Multidetector CT in diagnosing gastric cancer.

MATERIAL AND METHODS

This is a descriptive and diagnostic study. Totally 50 patients were selected for this study, Patients with abdominal complaint of pain, severe vomiting referred from departments of Medical and Surgical Gastroenterology, General Medicine and Surgery from our and other hospitals to our Department of Radiodiagnosis at Meenakshi Medical College Hospital & Research Institute between June 2024 & May 2025. The study was started after taking prior clearance and permission from the ethical committee and informed consent from all patients. All the patients were selected based on the inclusion and exclusion criteria. The inclusion criterion includes patients of any age and gender with clinical suspicion of gastric masses. And patients already diagnosed with gastric malignancy.

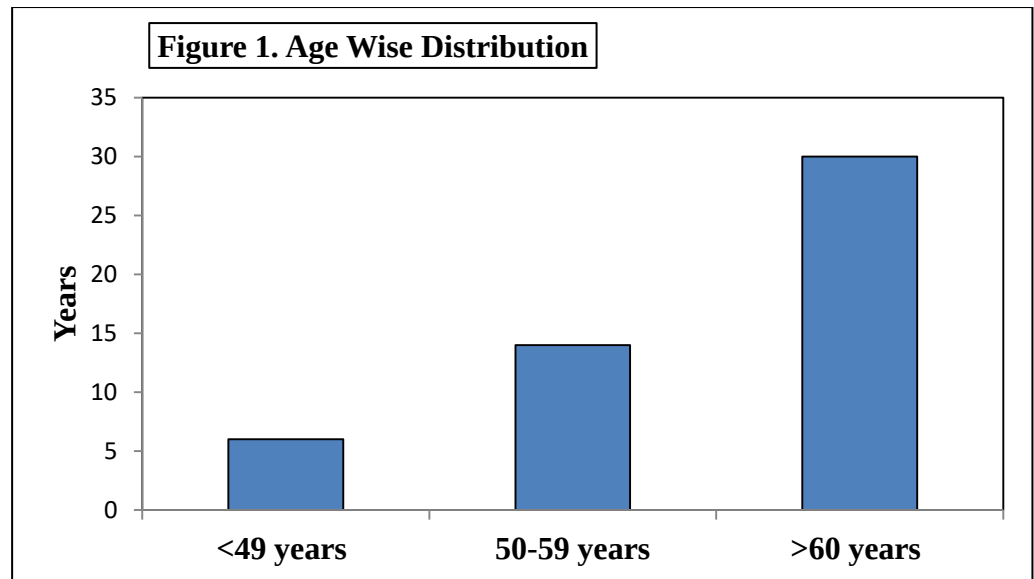
These patients were initially clinically examined by the Medical and Surgical Gastroenterologists, General physicians & Surgeons and then underwent Conventional UGI Endoscopy done by Gastroenterologists, who took biopsy samples as well. Then patients were referred for radiological evaluation. Informed consent from the patients were obtained. Then data was collected in a pretested proforma, meeting the objectives of this study. CECT abdomen with plain water as neutral contrast and IV contrast were performed. The radiologist reporting the CECT abdomen was blinded from the conventional UGI Endoscopy and HPE reports. Gastric growth reported in CECT abdomen which were not detected by Conventional UGI Endoscopy, such cases were referred back for endoscopy to collect biopsy samples from the lesion.

Statistical Analysis: The Statistical software SPSS 21.0, was used for the analysis of the data and Microsoft Word and Excel have been used to generate graphs, tables etc.

RESULTS AND OBSERVATIONS:

Agewise distribution of Gastric cancer Patients

Table.1 indicates that the age distribution in this study in relation to advanced stages of gastric cancer is that 12% of the individuals were affected with age less than or equal to 49 years, 28% of the individuals were affected with age between 50 – 59 years and 60% of the individuals were affected with age equal to or above 60 years.

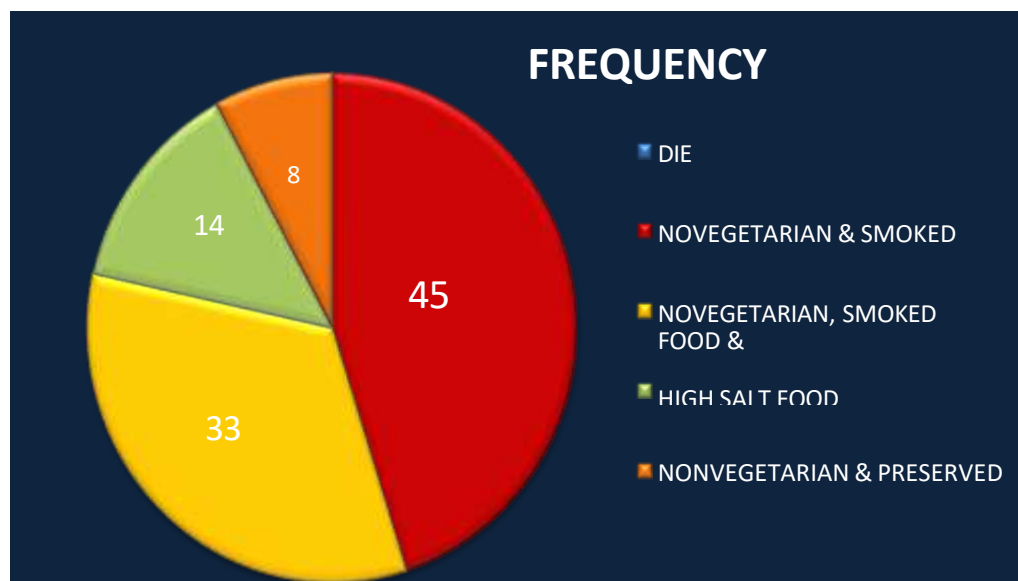


Diet Distribution – In Advanced Gastric Cancer

The dietary habits of individuals in this study in relation to advanced stages of gastric cancer is that 46% of individuals consumed non vegetarian & smoked food, 32% of individuals consumed non vegetarian, smoked food with high salt content in food, 14% of individuals consumed vegetarian food with high salt content and 8% of individuals consumed non vegetarian & preserved food (Figure 2)

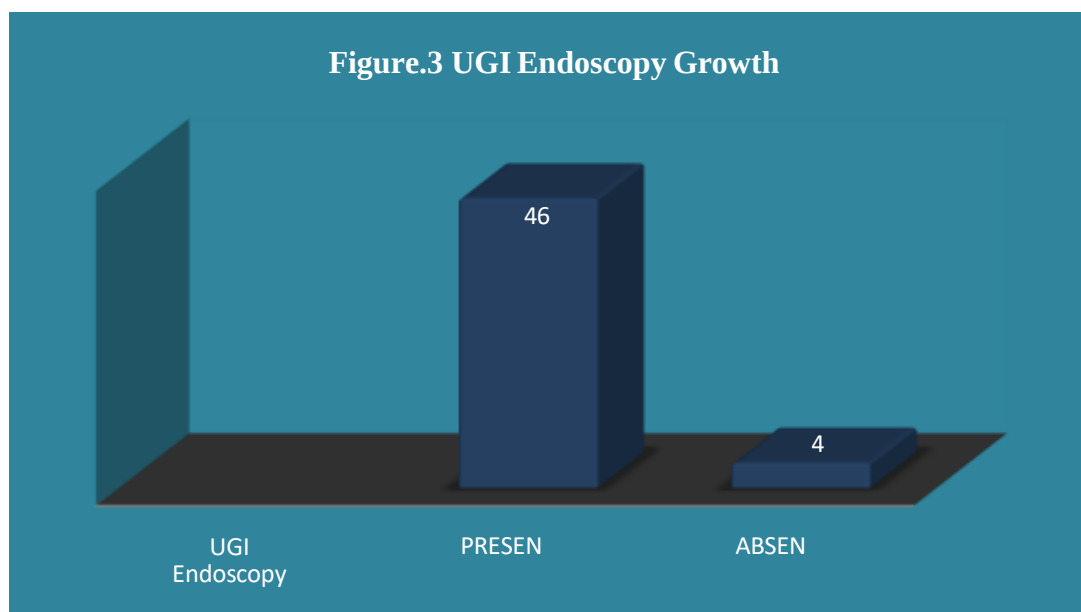
UGI Endoscopy Growth - In Advanced Gastric Cancer

Figure 3 indicates that the detection of growth by UGI Endoscopy in this study in relation to advanced stages of gastric



cancer is that 92% individuals had growth whereas 8% individuals didn't have growth.

UGI Endoscopy Gastric Outlet Obstruction- In Advanced Gastric Cancer



The detection of gastric outlet obstruction by UGI Endoscopy in this study in relation to advanced stages of gastric cancer is that 28% individuals had gastric outlet obstruction whereas 72% individuals didn't have gastric outlet obstruction.(table 1)

GASTRIC OUTLET OBSTRUCTION	Frequency	Percent
PRESENT	14	28.0
ABSENT	36	72.0
Total	50	100.0

UGI Endoscopy Surrounding Mucosa

The evaluation of surrounding mucosa by UGI Endoscopy in this study in relation to advanced stages of gastric cancer states that 74% individuals had normal mucosa surrounding the gastric growth/lesion whereas 26% individuals has inflamed and erythematous mucosa surrounding the gastric growth/lesion. (table 2)

Mucosa	Frequency	Percent
NORMAL	37	74.0
INFLAMED & ERYTHEMATOUS	13	26.0
Total	50	100.0

UGI Endoscopy Ulcer

The detection of ulcer with gastric growth by UGI Endoscopy in this study in relation to advanced stages of gastric cancer is that 56% individuals had ulcer whereas 44% individuals didn't have ulcer. (Table 3)

Ulcer	Frequency	Percent
PRESENT	28	56.0
ABSENT	22	44.0
Total	50	100.0

CECT Growth

The evaluation of gastric growth by CECT abdomen in this study in relation to advanced stages of gastric cancer states that 90% individuals had irregular circumferential mural wall thickening, 6% individuals polypoidal growth/lesion whereas 4% individuals had both irregular circumferential mural wall thickening & polypoidal growth/lesion (Table 4).

Growth	Frequency	Percent
Irregular circumferential mural wall thickening	45	90.0
Polypoidal growth/lesion	3	6.0
Irregular circumferential mural wall thickening & polypoidal growth/lesion	2	4.0
Total	50	100.0

CECT Growth Location

The detection of location of gastric growth by CECT abdomen in this study in relation to advanced stages of gastric cancer is that 10% individuals had growth in the body of stomach, 10% individuals had growth in the antrum of stomach, 6% individuals had growth in the pylorus of stomach, 28% individuals had growth in the body & antrum of stomach, 26% individuals had growth in the body, antrum & pylorus of stomach and 20% individuals had growth in the antrum & pylorus of stomach (Table 5).

Location	Frequency	Percent
Body	5	10.0
Antrum	5	10.0
Pylorus	3	6.0
Body & antrum	14	28.0
Body, antrum & Pylorus	13	26.0
Antrum & pylorus	10	20.0
Total	50	100.0

CECT STAGING– In Advance Gastric cancer

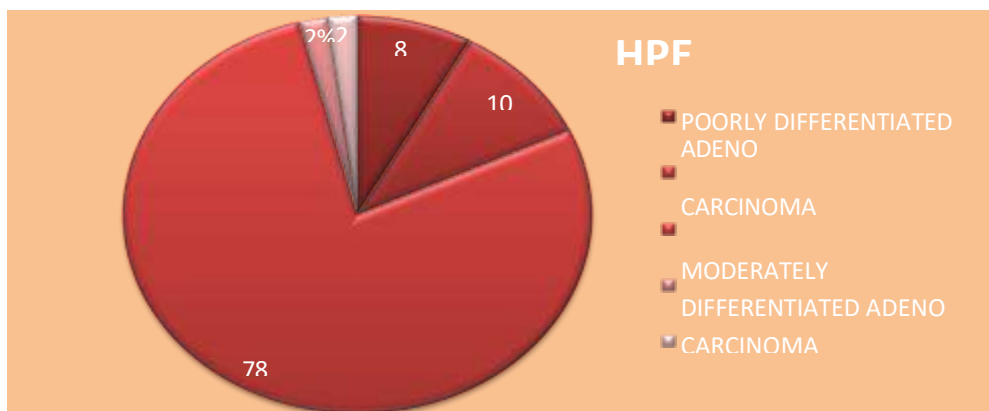
The staging of gastric cancer by CECT abdomen in this study stated that T2 or T3– 11 cases, T4a - 17 cases, T4b- 21 cases, N1- 5 cases, N2- 10 cases, N3- 22 cases and M1- 22 cases (Table 6).

TNM staging (7 th edition)	Histological criteria	Computed Topographic criteria	Number of Cases in present study
T1	Invasion of the lamina propria (T1a) or submucosa (T1b)	Lesion non detectable at CT Focal thickening or abnormal enhancement of the gastric mucosa, with a preserved hypodense strip deep to the lesion, corresponding to the submucosal layer	0
T2 or T3	Muscularis propria (T2) or subserosal layer (T3) invasion	Thickening and abnormal enhancement involving the whole thickness of the gastric wall, with smooth external contour of the stomach	11
T4a	Extraserosal extension (invasion of the visceral peritoneum)	Thickening and abnormal enhancement involving the whole thickness of the gastric wall, associated with linear or reticular striations	17

		extending towards the perigastric fat	
T4b	Invasion of adjacent organs/structures	The above described alterations extend to adjacent organs/structures	21
N1	1 or 2 positive lymph nodes	1 or 2 Enlarged lymph nodes	5
N2	3 to 6 positive lymph nodes	3 to 6 Enlarged lymph nodes	10
N3	7 or more positive lymph nodes	7 or more Enlarged lymph nodes	22
M1	Distant metastasis	Distant metastasis	22

Histopathological Examination

The detection of type of gastric malignancy by histopathological examination in this study in relation to gastric cancer states that 8% individuals had poorly differentiated adenocarcinoma, 10% individuals had moderately differentiated adenocarcinoma, 78% individuals had well differentiated adenocarcinoma, 2% individuals had well differentiated Non-



Hodgkin's lymphoma and remaining 2% had no gastric malignancy (Figure 4)

DISCUSSION

Gastric cancer in India according to previous studies was found to be one of the leading causes of death in Southern part of India. In developing countries still there is deficiency or unawareness of mass screening and poor endoscopy facilities which has lead to frequent miss of diagnosing gastric carcinoma [6,7]. Gastric cancer in this study was found to be at peak after fifth decade of life and was seen more in individuals aged >60 years (60% of cases in this study). Similar findings were observed in several other studies. Gastric cancer in this study was found to be more in male than females as seen in other studies[8]. In comparison to previous studies [10, 15], in present study there was slightly increased frequency of gastric cancer in females. The attributing factor to that is significant role of other risk factors like smoking and mainly dietary habits.

The prevalent risk factor these days considered is smoking, which was seen significant in this study with 72% of the individuals being smoker's out of 98% being positive for gastric cancer by HPE. Association between smoking and gastric malignancy is high and significant in comparison with other studies [9]. The most diverse and important risk factor leading to gastric cancer is dietary factors. In this study it was found that

dietary habits like consumption of non vegetarian food, smoked food and food with high salt content were the main variants. High salt content was a common factor in both non-vegetarians and vegetarians. Hence, as seen in previous studies [10] diet plays a very important role and dietary habits found in this study are similar in comparison with other studies. High salt in diet is an alarming factor seen in both non vegetarian and vegetarian individuals.

In this study 50 patients underwent Conventional UGI endoscopy which stated that gastric growth was present in 46 cases, in 2 cases there was poor visualization due to severe gastric outlet obstruction leading to food stasis, in 1 case was reported as pangastritis. The capability of this modality to detect gastric growth in this study was 92%, which is significant enough to say that Conventional UGI Endoscopy has the capability to detect gastric growth in advance gastric malignancy, similar results were observed in other studies[11].

The evaluation of gastric outlet obstruction by Conventional UGI endoscopy was found to be less significant in comparison to MDCT. Another significant finding which can be evaluated by Conventional UGI endoscopy is the mucosa. Any small change in colour or appearance can be easily picked up by Conventional

UGI endoscopy. In this study there were 13 cases reported to have inflamed and erythematous mucosa. Out of 4 cases where Conventional UGI endoscopy was not able to detect the gastric growth, 3 cases were reported to have inflamed and erythematous mucosa which is another important factor which suggests that there is need for further evaluation of such patients by higher imaging modalities. Hence the fact that though Conventional UGI endoscopy was not able to detect the growth in few cases but was able to comment in regards to predisposing conditions or associated findings of gastric cancer.

According to several studies [12] presence of gastric ulcer is a predisposing factor for formation of gastric cancer and also a additional common finding seen with growth which is better evaluated by Conventional UGI endoscopy. In this study 56% individuals had ulcer as secondary presentation with the gastric growth which was 92%. So in regards to the interpretation by Conventional UGI endoscopy, 46 cases had gastric growth. In that 28 cases had ulcer presentation as secondary finding which is more than 50%. Hence similar to previous studies this study also states that ulcer is common finding in regards to gastric cancer and needs further evaluation.

So after considering the findings in regards to Conventional UGI endoscopy we can say that it is a primary diagnostic investigation for patients suspected to have gastric malignancy. Therefore should be available in every basic healthcare setup across India and other developing countries specially to reduce the morbidity and mortality caused by gastric cancer.

The advantages of Conventional UGI endoscopy were that it's a simple procedure which is easily available, provides rapid evaluation and most important is very effective diagnosing modality in regards to relatively low cost. Conventional UGI endoscopy can also determine the location of the lesion, and explain its gross morphology, inflammation and obtain biopsy specimens from suspicious lesion which is very important and valuable as HPE is the gold standard for diagnosing malignancy.

However, Conventional UGI endoscopy has its own limitation as seen in other studies also, for accurate staging of the gastric cancer, especially the determination of depth of infiltration, and does not contribute to nodal staging and metastasis. This is where MDCT has a better role to play and provides such information as observed in this and previous studies. In this study the evaluation of advance gastric cancer by MDCT suggested that 90 % individuals had irregular circumferential mural wall thickening only, 6% had polypoidal growth and remaining 4% had both had irregular circumferential mural wall thickening with polypoidal growth. In comparison with other studies [13] where polypoidal cases are more common, in this

study it was found that irregular circumferential mural wall thickening is more common finding.

In this study all cases had gastric growth as per MDCT which states that its ability to detect growth is 100% which is very significant as seen in other studies [14] also, but the accuracy in diagnosing the disease was not 100% as out of 50 cases, 1 case had growth but was not malignant, rather it was tuberculosis. Which suggests the importance of differential diagnosis. The findings in this study in relation to the location of growth in stomach is most of the cases involved body, antrum and pylorus. In this study more than one part was more commonly involved, like more cases showed growth involving body and antrum as seen in other studies also [15]. In comparison to other studies [1] in this study we didn't find any lesion in the cardia.

Gastric outlet obstruction in contrast to Conventional UGI Endoscopy was better evaluated by MDCT in this study. In this study 66% had partial GOO, 22% had near complete GOO and 12% did not have any obstruction. In this study MDCT suggested that 38 cases had enlarged lymph nodes in which 14 cases showed necrosis.

MDCT is useful in regards to detection of metastasis. In this study out of 50 cases, 10 cases had local spread/ invasion in form of infiltration into adjacent fat planes and organs, 11 cases showed distant metastasis in form of involvement of different organs and 11 cases showed both local and distant metastasis, where as 18 cases didn't show any form of metastasis.

Using MDCT staging was done in this study and the results were as follows, T2 or T3- 11 cases, T4a - 17 cases, T4b- 21 cases, N1- 5 cases, N2- 10 cases, N3- 22 cases and M1- 22 cases. The benefit of evaluation of gastric cancer by MDCT is that it has the capability to comment on the lymph nodes and metastasis which is needed in staging the disease. The role of MDCT in staging is significant. As seen in several studies [7], this study also states that MDCT is the best modality available in present days because it has the capability to evaluate the disease in a broad way including all important criteria required as per TNM staging and various other staging pattern. In this study in relation to the types of gastric cancer detected by HPE, maximum were tubular and signet ring cell type adenocarcinoma. Less cases were mucinous & papillary type of adenocarcinoma and one case of Non-hodgkin's lymphoma as per WHO classification.

In this study 38% were of infiltrating type in HPE. In this study in regards to the appearance of type of HPE, 76% cases were well differentiated adenocarcinoma. Hence it was the most common appearance. There is little information available regarding the association between age, gender, smoking, dietary habits and the type of HPE appearance. This study was directed to find

an association between them, but in the Chi-Square Test, p value was found to be statistically insignificant. Hence no association was proved. The capability of Conventional UGI Endoscopy and MDCT in detection of growth in advance gastric cancer was evaluated in this study. After doing Chi-Square Tests it was found that p value was statistically insignificant. Hence it proves that both the modalities have statistically significant capability to detect growth in advance gastric malignancy. But it can be said non-statistically that according to this study capability to detect gastric growth by MDCT was 100% and by Conventional UGI endoscopy was 92%, hence MDCT is superior modality than Conventional UGI endoscopy in regards to detection of advance gastric cancer. As stated in other studies [7] also gastric cancer is a significant threat to global health, therefore there is still significant room for improvement with regard to prevention, early detection and intervention and life extending therapies.

CONCLUSION

Gastric cancer being a multifactorial disease is the second most common cause of cancer related death in the world, therefore it is important to have detailed understanding of several factors. Conventional UGI endoscopy is a better modality for primary screening of the gastric cancer and aids in diagnosing the premalignant conditions and being a low cost modality is another beneficial factor. MDCT is a superior modality in diagnosing advanced gastric cancer, it provides detailed imaging description leading to better staging of the disease, hence a step forward towards better treatment. The present study states that there are several environmental risk factors especially dietary habits and personal habits have significant impact on the causation of gastric cancer. Therefore there is a need for detailed mass screening in order to reduce the burden of morbidity and mortality caused by gastric cancer.

REFERENCES

1. Mehmet Mihmanli, Enver Ilhan, Ufuk Oguz Idiz, Ali Alemdar, Uygur Demir recent development and innovation in gastric cancer *World J Gastroenterol* 2016 May 7; 22(17): 4307-4320.
2. Junxiu Yu^{1*}, Yongjun He² and Zhen Guo¹ Age trend of the male to female sex ratio in surgical gastric cancer patients at a single institution *World Journal of Surgical Oncology* 2014, 12:269.
3. Yuan-Mao Lin, Nai-Chi Chiu, Anna Fen-Yao Li, Chien-An Liu, Yi-Hong Chou, and Yi-You Chiou Unusual gastric tumors and tumor-like lesions: Radiological with pathological correlation and literature review *World J Gastroenterol.* 2017 Apr 14; 23(14): 2493–2504.
4. Feng Chen, Yi-Cheng Ni, Kai-Er Zheng, Sheng-Hong Ju, Jun Sun, Xi-Long Ou, Man-Hua Xu, Hao Zhang, Guy Marchal Spiral CT in gastric carcinoma: Comparison with barium study, fiberoptic gastroscopy and histopathology *World J Gastroenterol* 2003;9(7):1404-1408.
5. Sano T, Kobori O, Muto T. LN metastasis from early gastric cancer: Endoscopic resection of tumour. *Br. J. Surg.* 1992, 79, 241-244.
6. Shao-Yin Duan, Dan-Tong Zhang, Qing-Chi Lin, Yan-Huan Wu Clinical value of CT three-dimensional imaging in diagnosing gastrointestinal tract diseases *World J Gastroenterol* 2006 May 14; 12(18): 2945-2948.
7. Giganti, F. et al. Pre-treatment MDCT-based texture analysis for therapy response prediction in gastric cancer: Comparison with tumour regression grade at final histology. *Eur J Radiol.* 90, 129–137 (2017).
8. Felix Berlth, Elfriede Bollschweiler, Uta Drebber, Arnulf H Hoelscher, Stefan Moenig Pathohistological classification systems in gastric cancer: Diagnostic relevance and prognostic value *World J Gastroenterol* 2014 May 21; 20(19): 5679-5684.
9. Lauren Peirce Carcas Gastric cancer review *J Carcinog.* 2014; 13: 14.
10. Smyth E.C., Nilsson M., Grabsch H.I., Van Grieken N.C., Lordick F. Gastric cancer. *Lancet.* 2020;396:635–648.
11. Giganti F., Antunes S., Salerno A., Ambrosi A., Marra P., Nicoletti R., Orsenigo E., Chiari D., Albarello L., Staudacher C., et al. Gastric cancer: Texture analysis from multidetector computed tomography as a potential preoperative prognostic biomarker. *Eur. Radiol.* 2017;27:1831–1839.
12. Juan M Marqués-Lespier, MD, María González-Pons, PhD, and Marcia Cruz-Correa, MD, PhD Current Perspectives on Gastric Cancer *Gastroenterol Clin North Am.* 2016 September ; 45(3): 413–428.
13. Kulke M.H., Shah M.H., Benson A.B., Bergsland E., Berlin J.D., Blaszkowsky L.S., Emerson L., Engstrom P.F., Fanta P., Giordano T., et al. Neuroendocrine Tumors, Version 1.2015. *J. Natl. Compr. Cancer Netw.* 2015;13:78–108.
14. Nie R.-C., Yuan S.-Q., Chen X.-J., Chen S., Xu L.-P., Chen Y.-M., Zhu B.-Y., Sun X.-W., Zhou Z.-W., Chen Y. Endoscopic ultrasonography compared with multidetector computed tomography for the preoperative staging of gastric cancer: A meta-analysis. *World J. Surg. Oncol.* 2017;15:113.
15. Li J., Shen W.-Z., Gu X.-Q., Hong W.-K., Wang Z.-Q. Prognostic value of EUS combined with MSCT in predicting the recurrence and metastasis of patients with gastric cancer. *Jpn. J. Clin. Oncol.* 2017;47:487–493.