



ORIGINAL ARTICLE

Effect of chemotherapy and radiation therapy on the swallowing of patients with head and neck cancer.

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ABSTRACT... Objective: To determine the effect of Chemotherapy and Radiation Therapy on the swallowing of Patients with Head and Neck Cancer. **Study Design:** Cross Sectional study. **Setting:** Jinnah Hospital Lahore. **Period:** August 2020 to April 2021. **Material & Methods:** It was performed on forty-nine adults of age range 19-58 years in having head and neck cancer and Glasgow coma scale score above 10. and purposive sampling technique was used. Patients who have received 50-70 Gy dosage and have completed at least 10 fractions of radiation therapy treatment or received 500-1000 Mg dosage and have completed at least 2 cycles of oral chemotherapy treatment were included. Sydney Swallow Questionnaire consisting of 17 questions, each with a 100mm long visual analogue scale for marking response except question 12, was filled by all participants and their responses were recorded. After 2 months of initial recordings same patients were asked to fill the same questionnaire. During therapy and post therapy results were recorded and paired sample T test was done on the data by using SPSS. **Results:** The results of SSQ shows 10.20% had scores depicting no swallowing difficulty. 40.82% scored 235-500 on SSQ scale showing mild symptoms of dysphagia, 30.61% show moderate swallowing impairment, 16.33% had moderately severe and 2.04% claimed severe dysphagia before the chemo and radio therapy. It represented that after chemo-radiation treatment, 4.06% had normal swallowing, 12.24% had mild issues, 24.49% had moderate, 32.65% patients claimed moderately severe dysphagia and 26.53% have severe dysphagia. **Conclusion:** Severity of swallowing difficulty was increased after the Chemotherapy and Radiation therapy.

Key words: Aspiration, Dysphagia, Radiotherapy, Sydney Swallow Questionnaire.

INTRODUCTION

Swallowing is a swift, active and complicated characteristic needing good coordinated motion of 30 clusters of muscular tissues and six cranial nerves positioned inside the head and neck area. It is fulfilled in 4 wonderful functional phases of which the initial three phases can be controlled at the same time whereas the fourth (esophageal) segment is not voluntarily controlled. It is the method in the human or animals that allows for any food to pass from the mouth, to the pharyngeal region, and into the esophagus, while closing the epiglottis. Swallowing method includes intake of food as liquid and solids. Any issue or inability in this method causing pulmonary aspiration leading to pneumonia.¹ Normal swallowing has

4 phases in general i.e Oral preparatory phase, oral phase, pharyngeal phase and esophageal phase. When a human has problem in any phase of swallowing with saliva, or any kind of food and has problem with swallowing, this state is called dysphagia. Glossopharyngeal, Trigeminal, Facial, Vagus and Hypoglossal nerve are crucial cranial nerves for secure oropharyngeal phase of swallowing. Any neurological cause can damage any of these nerves functionality, direct damage to any part of head and neck or its cancer can effect normal swallowing.² Many people with tumor of mouth, Head and Neck region, pharynx, and larynx experience dysphagia prior to medical management of the cancer, but treatments can cause dysphagia or

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make the already existing case more severe. The extent of the medical intervention to combat the cancer influences the swallowing profile.³ The subsequent limitations in swallowing can cause malnourishment and lack of hydration, and might prompt to aspiration pneumonia. The probability of development of dysphagia is most of the time predictable, dependent upon both tumor related structures and treatment modalities.⁴ Aspiration pneumonia is an unattended complaint after chemo-radiotherapy.⁵ Oral disease is the 6th most occurring tumor around the world. 300,000 patients which is 2.1% of the all out disease cases were tormented with cancer of the oral cavity and lip in 2012, 5000 patients died from malignant growth of the oral cavity and lip cancer.⁶

Emphasized treatment by chemo-radiotherapy (CRT) or fractionation radiotherapy (RT) is linked with comparatively better results but often leads to state of extreme early and late mucosal and pharyngeal injuries. Oral and pharyngeal region muscles of swallowing are mostly affected in head and neck cancer patients with development of oropharyngeal dysphagia. Recurrent reasons for dysphagia in this population incorporate neurological and neuromuscular impedance, auxiliary and iatrogenic causes. Dysphagia needs attention, as it can significantly decrease the personal satisfaction reducing his quality of life (QOL).⁷ Patient-related components that add to the advancement and seriousness of mucositis incorporate poor orodental cleanliness, smoking, liquor consumption, and burning- through hot and zesty food sources. Mucositis is a condition portrayed by aggravation of the oral mucosa bringing about torment and burning sensation with resulting limited oral feeding in patients with HNC going through RT. Mucositis is a typical result seen in 90%-100% of patients going through RT alone or with simultaneous chemotherapy.⁸

The need to conduct this study arises as dysphagia is an underreported implication among patients of head and neck cancer. This issue is untouched and needs attention as dysphagia leading to aspiration is a common cause of death in hospital settings. So far no Pakistani research is observed at this topic and previously. Appropriate evaluation

of dysphagia at an early stage may reduce the risk of tube feeding as dependence on a PEG or NG tube may lead to adverse swallowing ability in post-irradiated head and neck cancer patients possibly due to decreased use of the swallowing musculature.

These cases show that aspiration pneumonia is an unattended complaint after chemo-radiotherapy. More attention is needed for rehabilitation of normal swallowing. So far unfortunately in Pakistan no study has been done that accesses dysphagia in chemotherapy and radiation therapy patients. The recent study is the first statistical study that is conducted on the patients of a tertiary health care hospital. Limited sample size is the limitation of recent study. It is also recommended that bedside evaluation and dietary modifications in food intake of these clients will help in prevention from aspiration and other worst effect. Therefore, early intervention will help in reducing aspiration related morbidity and increase nutritional level to help patients fight their primary disease.⁵

MATERIAL & METHODS

The purpose of this study was to find out the effect of chemo-radiation treatment on swallowing of patients with head and neck cancer. Comparative cross sectional observational study design was used and adult patients age between 19 to 58 years old diagnosed with head and neck cancer were included. Purposive sampling technique was used and responses were collected in person for 9 months (August 2020- April 2021). The data was statistically analyzed through SPSS-21. Sample size 49 was calculated through online calculator. The confidence level of 95% was used that the real value was within $\pm 5\%$ of proportional difference in pre and post treatment.⁹ Formula used for sample calculation is as follows:

All those patients who were enlisted for chemo-radiotherapy were included. Head and neck cancer patients who had received 50-70 Gy⁹ dosage and have completed at least 10 fractions of radiation therapy were surveyed before and after therapy. Head and neck tumor patients who have received 500-1000 Mg dosage and have completed at least 2 cycles of oral chemotherapy

treatment were included.¹⁰

Sydney Swallow Questionnaire, a form consisting of 17 questions, each with a 100mm long visual analogue scale for marking response except question 12, was utilized. It is a self-report questionnaire, which was created to quantify symptomatic seriousness of oral-pharyngeal dysphagia as claimed by the influenced patient. The total complete score is determined by adding the 16 individual VAS scores and the score for Q12 multiplied by 20. In this way changing over the scope of potential scores for Q12 from 0-5 to 0-100, reliable with the leftover 16 inquiries, to yield an absolute score out of a potential limit of 1700. Cronbach’s coefficient α (>0.70) and Spearman’s correlation ($p > 0.60$) value indicates adequate internal consistency and reliability. Construct validity and criteria validity of the SSQ was found to be significant ($P < 0.01$).¹

The questionnaire was circulated to 49 HNC patients in Jinnah hospital from August 2020 to April 2021, Lahore. Firstly, ethical letter (IRB/UOL-FAHS/745/2020) for data collection was signed by head of department, University of Lahore. The same permission letter was presented to head of oncology and radiation therapy department, Jinnah hospital, Lahore for approval of data collection. Consent form was approved by cancer patient and carer. Both consent form English and Urdu were available for participants to get better understanding of the terms. Demographic sheet was filled by SLP based on the data obtained from the carer and some information was taken from their case files. Self-rating questionnaire SSQ was elaborated to participants and they were informed that how their responses will be rated. SSQ was used for patient to mark their responses during therapy treatment going on. After 2 months of gathering responses first, same patients were contacted again and same questionnaire was filled by patient. All these responses were recorded and analyzed using Statistical Package for social sciences (SPSS) version 21.

RESULTS

Table-I shows the gender distribution of all the patients from which data was collected. 67.3%

males were included in study and 32.7% females were involved.

Gender		Frequency	Percent
Valid	Male	33	67.3
	Female	16	32.7
	Total	49	100.0

Table-I

Figure-1 show that most of the participants 48.82%, included in this study has oral tumor. 34.69% had laryngeal cancer. 22.45% had tumor of nasopharynx and only 2.04% had pharyngeal region tumor.

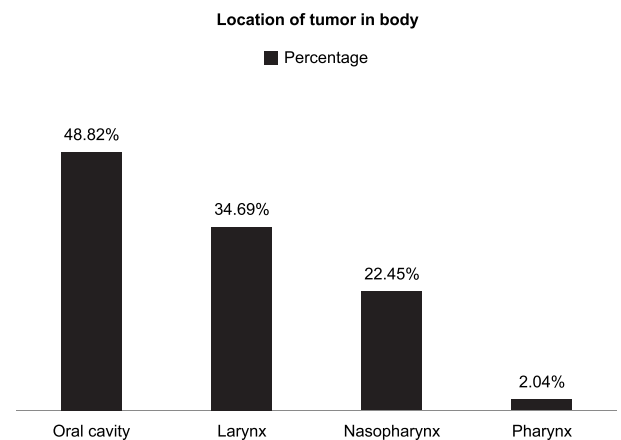


Figure-1

Figure-2 shows distribution of sample on the base of their tumor stage. Most of patients i-e 55.10% had stage 2 of cancer. 22.45% were at stage 1 of their tumor whereas, 14.29% were diagnosed with stage 3 tumor. Only 8.16% had stage 4 cancer in patients included.

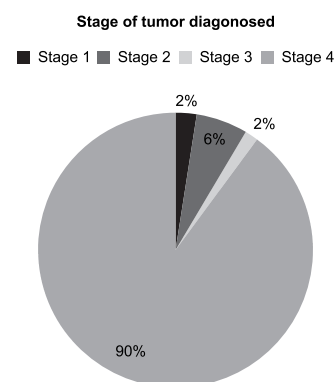


Figure-2

40%, 20 feel 41-60%, 6 face 61-80% difficulty and only 1 participant feel 81-100% difficulty in swallowing soft foods. With hard solid foods, 15 participant face 61-80%, 11 feel 81-100%, 8 face 21-40%, 11 feel 41-60% and only 4 patients feel they face 0-20% struggle. For dry solid foods 17, 14 and 9 participants feel 61-80%, 41-60% an 81-100% difficulty respectively. Out of 40, 5 patients face 0-20% and 4 face 21-40% difficulty in swallowing dry solid food.

Figure-3 represented that 57.14% patients claimed that they had pain with swallowing. 20.41% said that they sometimes face xerostomia with mastication or gulping of food. Only 22.45% claimed that they do not feel any pain with swallowing of food.

Table-III displays frequency of feeling of cough or choke with food consistencies. Out of 49, 24 patients feel 41-60%, 15 face 21-40%, 7 face 61-80% and only 3 participants feel they face up to 20% that food is getting stuck in their throat. With

liquid foods 23, 15 and 6 participants feel 41-60%, 21-40% and 61-80% respectively that food will cause them to cough or choke. While taking solid food, 18 patients feel 41-60%, 7 feel 61-80%, 6 feel 21-40% and only 2 patients feel 81-100% chances of food being choked.

Figure-4 shows that when data calculated from patients in first meeting with their chemo-radiation therapy going 40.82% scored 235-500 on SSQ scale showing mild symptoms of dysphagia whereas 30.61% scored showing moderate swallowing impairment. 16.33% and 2.04% showed moderately severe and severe dysphagia respectively. 10.20% had scores depicting no swallowing difficulty.

Table-V show mean is 411.89 and SD standard deviation is 431.99. So, the p value of paired sample T test is 0.000 which means there was significant mean difference in score of SSQ questionnaire filed by participants during and after the radiation treatment.

Percentage of difficulty felt by patients	0-20%	21-40%	41-60%	61-80%	81-100%
Swallowing liquids	6	20	11	12	0
Swallowing soft food	8	14	20	6	1
Swallowing hard solid food	4	8	11	15	11
Swallowing dry solid food	5	4	14	17	9

Table-II. Frequency of difficulty felt by patients with different consistencies of food

Percentage of difficulty felt by patients	0-20%	21-40%	41-60%	61-80%	81-100%
Feeling of food getting stuck in the throat	3	15	24	7	0
Feeling of cough/ choke with liquid foods	5	15	23	6	0
Feeling of cough/ choke with solid foods	6	6	18	7	2

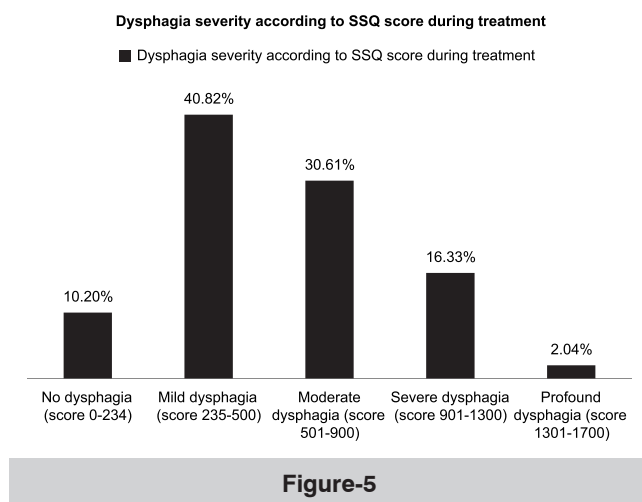
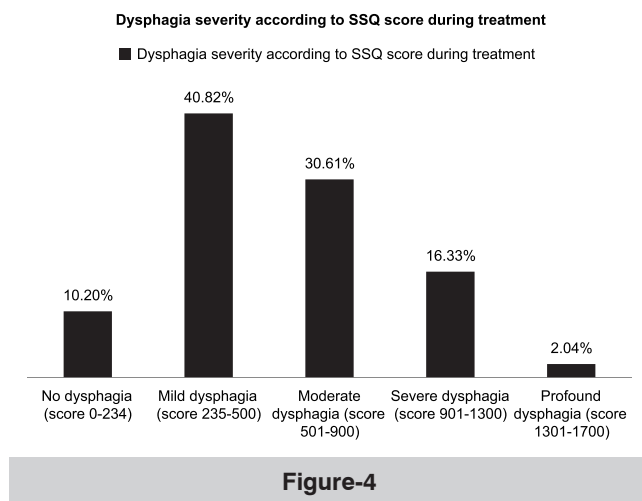
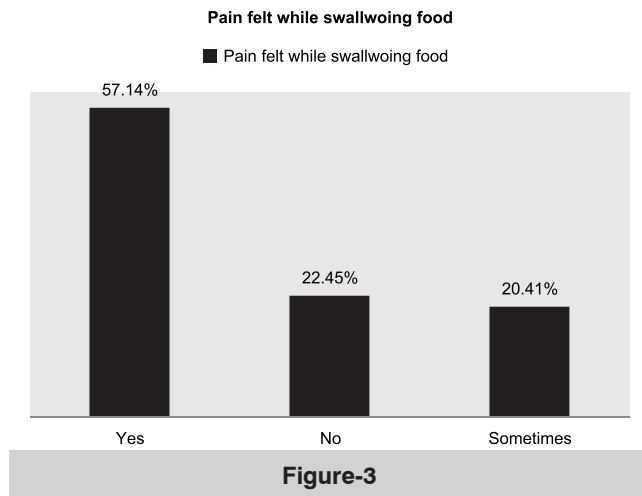
Table-III. Feeling of Cough or choke with different types of foods

	Mean	N	Std. deviation
Total SSQ score calculated in before treatment	594.5918	49	328.33170
Total SSQ score calculated after treatment	1006.4898	49	435.31340

Table-IV. Paired samples statistics

Paired samples test Paired differences									
	Mean	Standard Deviation	Standard error mean	95% confidence interval of the difference		t	df	Sig. (2- tailed)	
Total SSQ score calculated during treatment- Total SSQ score calculated after treatment	411.8979	431.9979	61.71400	Lower 535.9822	Upper 287.8136	6.674	49	.000	

Table-V



DISCUSSION

The current study highlights the effect of therapeutic treatments on mechanism of normal swallowing in patients with head and neck

tumor. Pain and difficulty in mastication was a prominent complaint faced by the patients included. SSQ total scores before and after the treatment were evaluated and compared coming up with outcomes that the swallowing difficulties are exaggerated in clients immediately after the treatment. The symptoms of dysphagia start to taper off as the time passes by and therapy is completed. In the current study 57.14% patients claimed that they have pain with swallowing where as only 22.45% claimed that they do not feel any pain with swallowing of food. An Australian study depicts the similar results and the types of symptoms felt by the patients themselves are different in every case. In that research, 62% of people reported change of taste, painful swallow (xerostomia) 56%, thick mucus was formed in 33% and 20% reported mouth or throat pains. This comprehensive data collection across all types of tumor patients gave a clear picture of incidence of dysphagia signs in all of them.¹¹ Reliance on a PEG may prompt unfriendly gulping capacity in post-illuminated head and neck disease patients perhaps because of diminished utilization of the gulping musculature.⁹

Severity of swallowing concern is different in all types of tumors and concerns with different textures of food felt by patients are different. Recent study shows that most of the participants with oral tumor had difficulty in swallowing hard textured food. 14.29% of participants having oral tumor had difficulty in mastication of hard food. 6.12% of patients with laryngeal cancer had a hard time in swallowing hard food. 2.04% having pharyngeal tumor had difficulty in chewing hard textured food. A study performed in 2013 showed different dysphagic signs claimed by participants who had oropharyngeal and oral cancer. 29.6% patients had oral cancer (OC) whereas 70.4% had oropharyngeal (OP) cancer. Results depicted were OC patients had more issues dealing with hard, dry food taking more time to finish meal, problem dealing their own saliva and coughing/choking with solid food. On the other hand OP patients had more difficulties with swallowing dry food, food getting stuck in throat, coughing or choking with hard solid foods and nasal regurgitation of food.¹¹ Under discussion study

also revealed that severe dysphagia was found mostly in oral cavity tumor patients. 12.24% of patients having oral tumor had severe dysphagia, 8.16% of participants with severe dysphagia had laryngeal tumor whereas only 6.12% of patients with severe dysphagia had nasopharyngeal region tumor.

Another previous study showed that before treatment, there were 18 patients with grade 1 dysphagia, 18 those who had grade 2 dysphagia and 9 grade 3 dysphagic patients. Those with grade 4 were 8, 3 of clients had grade 5 dysphagia, 3 had grade 6 and 4 of them have grade 7 of dysphagia. Results observed post chemo-radiation, at an approximate follow-up of 2 months (1-10 months), which showed that only one patient had grade 1 of dysphagia, eight patients had grade 2 dysphagia, nine patients had grade 3 of dysphagia, eight patients had dysphagia of grade 4. Out of them 13 patients had grade 5, seven patients had grade 6, and 11 patients had grade 7 of dysphagia.¹² Study performed currently also shows similar results. It showed that when data calculated from patients in first meeting with their chemo-radiation therapy going 10.20% had scores depicting no swallowing difficulty. 40.82% scored 235-500 on SSQ scale showing mild symptoms of dysphagia, 30.61% show moderate swallowing impairment, 16.33% had moderately severe and 2.04% claimed severe dysphagia. 10.20% had scores depicting no swallowing difficulty. It represented that after chemo-radiation treatment, 4.06% had normal swallowing, 12.24% had mild issues, 24.49% had moderate, 3.65% patients claimed moderately severe dysphagia and 26.53% have severe dysphagia with SSQ scores between 1301-1700.

The signs of dysphagia and severity worsen itself with the duration after the treatment is received. Post therapy dysfunctions were observed in a study that included reduced functionality of epiglottis, belated activation of gag reflex, and poor propulsion of food toward base of tongue, bolus formation and inappropriate closing of larynx that leads to aspiration in many cases. Aspiration was observed before therapy in 14% of patients and in 65% early after therapy. 62%

reported the signs of dysphagia late post therapy.⁵ Severe dysphagia leading to aspiration pre and post therapy had $p=0.0002$. Current study showed that the mean SSQ score during the treatment was 594.5 whereas that obtained after the therapy was 1006.4 which shows that the risk of aspiration has increased in the post treatment patients. When data was collected after treatment 77.6% of patients were still on oral feed. 12.2% of the all participants were shifted to NG tube and 10.2% of the patients were shifted to PEG tubes by the end of treatment.

The risk of aspiration or silent aspiration is also an important feature observed in HNC patients. A study postulated that aspiration rates were not monitored alertly causing prolonged tube feeding during and after the treatment. Because of silent features of aspiration, they are under reported and therefore cannot be compensated on time.¹² The recent study also showed that after chemo-radiotherapy out of total 10.20% participants were transferred to PEG tube feeding and 12.24% were shifted to NG feed for their caloric intake.

116 patients, who had received radiotherapy in St. George hospital cancer care and were included in a study to find the effect of treatment type on swallowing impairments. The outcomes were that group who has received only radiotherapy had 52% dysphagic patients whereas those who have received chemo-radiotherapy had 69% of prevalence of swallowing impairments.⁴ It shows radiotherapy concurrent with chemotherapy puts some adverse effects on swallowing mechanism. Studies report that radio-chemotherapy adds to intensity and duration of mucositis. Pharyngeal fibrosis, acute mucositis and prolonged swallowing impairment were observed to be major contributors in head and neck cancer. Similar outcomes were observed in current study that presented that 36.73% of patients received only radiotherapy and 30.61% received chemo-radiotherapy. 22.45% of people had a surgery with their radiation treatment. Highest effect on swallowing was observed in those who have chemotherapy concurrent with radiation therapy and those who receive only chemotherapy were infected the least with the treatment.

CONCLUSION

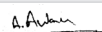




Dysphagia is a persistent and prevalent complexity reported in head and neck cancer patients. It mostly remains unrecognized and runs in long term with the patient. Difficulties faced by patients include pain, feeling of cough or choke, nasal regurgitation and needs of repeated swallows. Dry and hard solid foods are most difficult to swallow by such patients.

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2	Hafsa Noreen	Supervision, Review article.	
3	M. Sikander Ghayas Khan	Statistical analysis.	
4	Rashid Hussain Memon	Proof reading.	
5	Malik Muhammad Qasim	Article writing.	
6	Lubna Noureen	Article review.	