INTRODUCTION

One of the major causes of death throughout the world remains the cancer. Carcinogenesis is a multifactorial phenomenon with a complex interplay between genetics and environmental factors; mainly related to healthy habits and lifestyle. Cancer may also be caused by oxidative stress in addition to these factors. In the recent past, though exponential progress in the prevention and management of cancers have taken place, still studies available on awareness programs regarding anti-cancer impact of vegetables are limited. Aim of this study is thus to assess the baseline knowledge of Dental Graduates about the anti-cancer vegetables with the aim that their knowledge will have an impact on the awareness of the community.

METHODOLOGY: The study was conducted through a 10 instrument questionnaire on a sample consisted of Sixty Four Dental Graduates (24 males and 40 females) from University College of Dentistry, The University of Lahore.

RESULTS: Awareness regarding different vegetables that can have anticancer effect was assessed through the questionnaire. Baseline knowledge of Dental graduates about anticancer effect of vegetables was limited and only 7-11% of the Dental Graduates were actually aware of the antitumorigenic effect of different vegetables.

CONCLUSION: This study concludes that baseline knowledge of dental graduates about anti-cancer effects of vegetables was poor.

KEYWORDS: Anti-cancer vegetables, cancer, cancer awareness program.


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found a potent anticancer effect of glucosinolate found in cruciferous vegetables\textsuperscript{13}. Ahmadi A, Shadboorestan A in their study found that flavonoids one of the most important ingredients in vegetables and fruits exhibits an anti-cancer effect\textsuperscript{14}. Michaud DS et al in their study found that 20\% increase in vegetable intake generally corresponds to a 20\% decrease in cancer rates, and a 20\% increase in cruciferous vegetable intake corresponds to a 40\% decrease in cancer rates\textsuperscript{15}. Cohen JH et al in another study found that 28 servings of vegetables per week decreases prostate cancer risk by 33\%, moreover just 3 servings of cruciferous vegetables per week decreased prostate cancer risk by 41\%.\textsuperscript{16} It is worth mentioning here that cruciform vegetables includes: Bok Choy, Broccoli, Broccolini, Cabbage, Cauliflower, Mustard green, radish and turnip etc\textsuperscript{17}.

Though research have shown the importance of diet and physical activity in preventing cancers and awareness programs have been introduced and reported but still studies available on awareness programs regarding anti-cancer impact of vegetables are limited. Yong-chuan Wang et al in their study found that strategies for cancer prevention and control implemented in the USA can be valuable models for China\textsuperscript{18}. The same can be over extended for other countries. Ken Yamaguchi reported cancer prevention programs in Japan\textsuperscript{19}. These can be valuable modes for cancer control. Fotedar V et al in their study concluded that though the mean knowledge of the population about cancers is good but the knowledge and practices about risk factors had to be reinforced\textsuperscript{20}. Altin C et al in their study concluded that limited cancer literacy instruments are available\textsuperscript{21}. Aim of this study is thus to assess the base line knowledge of Dental Graduates about the anti-cancer vegetables with the aim that their knowledge will have an impact on the awareness of the community.

**METHODOLOGY**

The study was conducted through a 10 instrument questionnaire on a sample consisted of Sixty Four Dental Graduates (24 males and 40 females) from University College of Dentistry, The University of Lahore. After obtaining informed consent they were given a questionnaire. Questionnaire comprised of 10 instruments each testing different vegetables that might have an impact as anti-cancer diet. Data was then analyzed using SPSS 16.0 and frequency and percentage for each instrument for each subject was then calculated.

**Questionnaire**

Q1 Do you know that diet has an impact in preventing cancers?
Q2. What do you think whether Broccoli has any anti-carcinogenic effect?
Q3. What do you think whether Brussels Sprout has any anti-carcinogenic effect?
Q4. What do you think whether Cabbage has any anti-carcinogenic effect?
Q5. What do you think whether Cauliflower has any anti-carcinogenic effect?
Q6. What do you think whether Raddish has any anti-carcinogenic effect?
Q7. What do you think whether Turnip has any anti-carcinogenic effect?
Q8. What do you think whether Spanich has any anti-carcinogenic effect?
Q9. What do you think whether Tomato has any anti-carcinogenic effect?
Q10. Do you think that this questioner has improved your awareness regarding anti-cancer Vegetables?

**RESULTS**

Dental Graduates perspective regarding anti-cancer vegetables has been discussed in table 1.

<table>
<thead>
<tr>
<th>Q2</th>
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Table 1: Frequency and Percentage of each question used to assess the role of different vegetables as anti-carcinogenic agents
DISCUSSION

The quality and quantity of diet has direct impact on systemic health. Considering these effects, our questionnaire comprised of 10 instruments related to anti-cancer vegetables especially cruciforous vegetables was presented to each subject and base line knowledge of dental graduates regarding anti-cancer vegetables was assessed. First question was related to the fact that whether they have any idea about the role of diet in preventing cancers; 81% of the dental graduates were aware of this fact in our study.

Amjad AI et al in their study found an anti oxidant to anti-cancer effect of Sulforaphane (SFN) a metabolic by product of cruciferous vegetables especially found in Broccoli. Qazi et al in another study found that a natural product Sulforaphane (SFN) with antioxidant properties from brocoli has great potential to be used in chemoprevention. John D. Clarke, Roderick H. Dashwood, Emily Ho in their study found that Isothiocyanates (Sulfaphane) found in cruciferous vegetables such as broccoli and Brussels sprouts may lower overall cancer risk, including colon and prostate cancer. Y Zhang et al in another study have supported the anti-carcinogenic effect ingredients found in Broccoli. Campas-Baypoli, O.N et al in another study found potent anticancer effect of Sulforaphane (SFN) a by product of Broccoli. Matsui, T et al in their study also found that Sulfaphane (SFN) exhibit a potent anti-cancer effect especially in osteosarcomas. Unfortunately only 9.37% of the Dental Graduates in this study were aware of well known anti-cancer effect of Broccoli.

Brussels sprouts, kale, broccoli and various cabbages were found to possess very potent anti-cancer activities as observed in both epidemiological and laboratory studies. de Figueiredo SM et al in their study established that Sulforaphane (SFN) a phytochemical commonly found in cruciferous vegetables such as broccoli, brussels sprouts and cabbages exhibits anti-cancer effect. Unfortunately only 10.94% of the Dental Graduates in this study were aware of well known anti-cancer effect of Brussels Sprouts.

Cabbage has been reported to possess anti-oxidant and anti-inflammatory effects which may have preventive role in chronic disorders. Fresh cabbage juice, prepared either separately or mixed with other vegetables such as carrot and celery, is often included in many commercial weight-loss diets, diets that improve the bioavailable content of nonheme iron, as well as alternative therapies for cancer patients. Renuka DJ, Berla TE in another study found that Sulforaphane (SFN) an isothiocyanate formed by hydrolysis of glucosinolates found in Brassica oleracea possess anticancer and antioxidant activities. Unfortunately only 12.5% of the Dental Graduates in this study were aware of well known anti-cancer effect of Cabbage.

A lower cancer incidence has been linked with consumption of cauliflower and cruciforous vegetables. Interestingly, PEITC is an anti-cancer compound found in vegetables and was first reported in 2014. Unfortunately only 9.37% of the Dental Graduates in this study were aware of well known anti-cancer effect of Cabbage.

O'Hare T.J. et al in their study found that radish sprouts have potentially greater chemoprotective action against carcinogens than broccoli sprouts. Gutiérrez RMP and Perez RL in their study found that aqueous extract of the salted Radish roots showed antimutagenic activity against Salmonella typhimurium TA98 and TA100. O'Hare T.J. et al in their study found that Daikon radish exhibit potential anti-cancer effects. Unfortunately only 7.81% of the Dental Graduates in this study were aware of well known anti-cancer effect of Raddish.

Turnip exhibit anti-tumorigenic activity due to Indoles found in it. In another study indicated the presence of strong antimutagenic factors and hydroxyl radical scavengers in Turnip seeds. Unfortunately only 7.81% of the Dental Graduates in this study were aware of well known anti-cancer effect of Turnip.

Recently, a case-control study of dietary factors and gastric cancer in Korean patients reported that high consumption of food rich in nitrate, including cooked spinach, increases the risk of gastric cancer. In our study 9.37% of the Dental Graduates were aware of anti-cancer effect of Spanishich.

Flavonoids also found in tomato have been demonstrated to inhibit carcinogenesis in vitro and substantial evidence indicates that they can also do so in vivo. Chick WDW et al in their study found that
tomato leaves extract significantly contains purified active fractions with anti-cancer properties. Bhuvaneswari V and Nagini S in their study found that lycopene found in tomat exhibits an array of biological effects including cardioprotective, anti-inflammatory, antimutagenic and anticarcinogenic activities. Rao AV and Agarwal S. Dietary intakes of tomatoes and tomato products containing lycopene have been associated with decreased risk of chronic diseases such as cancer and cardiovascular diseases. Scolastici C et al in a study found that in addition to its antioxidant properties, lycopene shows an array of biological effects including antimutagenic and anticarcinogenic activities. In our study only 10.94% of the Dental Graduates were aware of anti-cancer effect of Tomato.

In last 89% of dental graduates believed that this questionnaire has improved their base line knowledge about anti-cancer diet. These types of surveys and awareness camps should be conducted at regular intervals to improve the base line knowledge of health professionals and community.

CONCLUSION

This study concludes that base line knowledge about anti-cancer vegetables needs improvement. This may help in changing the dietary habits and thus may help in reducer the increasing incidence of cancers.

Authors' contributions:
SA Conceived, designed, analyzed and wrote the manuscript, MT contributed in data collection and data analysis, AS contributed in data collection and data analysis.

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