

Journal of Bioresource Management

Volume 7 | Issue 2

Article 8

Trends in Cancer Prevalence in Punjab, Pakistan: A Systematic Study from 2010 to 2016

Sana Hafeez

Department of Zoology, GC University, Lahore, sunnystar90@gmail.com

Asmat Mahmood

Department of Zoology, GC University, Lahore, asmatmahmood76@gmail.com

Rizwan Ullah Khan

Department of Zoology, GC University, Lahore, rizz.970@gmail.com

Naila Malkani

Department of Zoology, GC University, Lahore, nailamalkani@gcu.edu.pk

Follow this and additional works at: <https://corescholar.libraries.wright.edu/jbm>



Part of the [Oncology Commons](#), and the [Other Medicine and Health Sciences Commons](#)

Recommended Citation

Hafeez, S., Mahmood, A., Khan, R., & Malkani, N. (2020). Trends in Cancer Prevalence in Punjab, Pakistan: A Systematic Study from 2010 to 2016, *Journal of Bioresource Management*, 7 (2).

DOI: <https://doi.org/10.35691/JBM.0202.0133>

ISSN: 2309-3854 online

(Received: Apr 29, 2020; Accepted: May 2, 2020; Published: Jun 29, 2020)

This Article is brought to you for free and open access by CORE Scholar. It has been accepted for inclusion in *Journal of Bioresource Management* by an authorized editor of CORE Scholar. For more information, please contact library-corescholar@wright.edu.

Trends in Cancer Prevalence in Punjab, Pakistan: A Systematic Study from 2010 to 2016

Cover Page Footnote

The authors are thankful to the staff present at the data collection centers for their permissions and access to the data.

© Copyrights of all the papers published in Journal of Bioresource Management are with its publisher, Center for Bioresource Research (CBR) Islamabad, Pakistan. This permits anyone to copy, redistribute, remix, transmit and adapt the work for non-commercial purposes provided the original work and source is appropriately cited. Journal of Bioresource Management does not grant you any other rights in relation to this website or the material on this website. In other words, all other rights are reserved. For the avoidance of doubt, you must not adapt, edit, change, transform, publish, republish, distribute, redistribute, broadcast, rebroadcast or show or play in public this website or the material on this website (in any form or media) without appropriately and conspicuously citing the original work and source or Journal of Bioresource Management's prior written permission.

TRENDS IN CANCER PREVALENCE IN PUNJAB, PAKISTAN: A SYSTEMATIC STUDY FROM 2010 TO 2016

SANA HAFEEZ, ASMAT MAHMOOD, RIZWAN ULLAH KHAN AND NAILA MALKANI*

Department of Zoology, GC University, Lahore

*Corresponding author: nailamalkani@gcu.edu.pk

ABSTRACT

Cancer is the second leading cause of death globally. However, in Pakistan, in the absence of a national cancer registry, it is difficult to predict the current status of cancer incidence. Therefore, a need was felt to design a study that can give a depiction of the prevalence of common cancer types and their relevance to the local population in the absence of a proper cancer registry system. In view of this, data was collected from 2010 to 2016 for breast, prostate, head and neck, cervical and colorectal cancer from the cancer hospitals and centres located all over Punjab, Pakistan. All the data were analysed to calculate prevalence percentage, gender-based incidence rate, crude rate, and Age-specific rate (ASR) for each cancer type. The results showed that breast cancer was the most common type and its prevalence showed a linear increase through the study period ($P < 0.001$). Breast cancer (6561) was followed by prostate (1183), head and neck (833), cervical (697) and colorectal cancer (531) in terms of prevalence. Gender-specific cancers like breast, prostate, and cervical were found to be more common as compared to others. In the case of head and neck and colorectal cancers, males were more susceptible as compared to females. There is a radical increase in cancer cases in the study area and the same could be extrapolated to the whole country. Therefore, for the appropriate and focused efforts to combat this increasing trend of prevalence, it should be constantly monitored, which leads to the recommendation of an effective cancer registry system in the country.

Keywords: Breast cancer, prostate cancer, incidence, prevalence, age-specific rate.

INTRODUCTION

Cancer is becoming the leading cause of disease-related deaths throughout the world (Ma and Yu, 2006). Several factors are contributing to the spread of this disease like smoking, poor diet, physical inactivity, solar radiations, X-rays, radioactive substances, lack of exercise, and some viruses that cause DNA mutations and genetic predispositions (Torre et al., 2015). GLOBOCAN recorded 18.1 million incident cases in 2018 and this number is predicted to increase to over 29.5 million by 2040. Out of all the reported cancers, lung cancer is the most commonly diagnosed cancer (11.6% of

the total cases) and also the main cause of cancer-related deaths (18.4% of the total cancer deaths) in both males and females throughout the world.

The incidence of breast cancer (11.6%) is similar to lung cancer followed by prostate cancer (7.1%), and colorectal cancer (6.1%), and for mortality rate, it is followed by colorectal cancer (9.2%), stomach cancer (8.2%), and liver cancer (8.2%). In males the most prevalent type of cancer is lung cancer which is also the main cause of death, it is then followed by colorectal and prostate cancer for incidence, and for mortality, it is followed by liver and stomach cancer. In females, the most

commonly diagnosed and principal cause of cancer-related deaths is breast cancer (24.2%) followed by colorectal (9.5%), lung (8.4), and cervical cancer (6.6) (Bray et al., 2018).

Cancer burden is increasing globally. However, Asia being the largest continent is most affected. Over 48% of the reported cases belong to Asia, with a survival rate of less than 50%. Despite advancements in medical sciences, the death toll due to cancer is constantly on the rise. It claimed over 9.5 million lives worldwide with a mortality rate of over 50% in 2018 (GLOBOCAN, 2018). Cancer encumbers the health management system and economy of a country, especially a developing country like Pakistan. There is a need to monitor the trends of the disease aetiology so that an efficient prevention and treatment strategy can be devised. Therefore, this study aimed to determine trends in major cancers (breast, prostate, head and neck, cervical, and colon) prevalence in Pakistan for the period 2010 to 2016.

MATERIALS AND METHODS

For the collection of data, a comprehensive clinical history of the cases diagnosed with breast, prostate, head and neck, cervical, and colorectal cancers during the period of 2010 to 2016 were obtained. The data was obtained from institutes of nuclear medicine (CENUM, PINUM and GINUM, and Shaukat Khanum) which are located in Lahore, Faisalabad, and Gujranwala. The data was also collected from the Punjab cancer registry. The necessary permissions for data collection were obtained from these institutes. The information from each source was properly documented and grouped according to gender and age.

Several parameters were set for data analysis, like geographical region, age at the time of diagnosis, stage of cancer, and gender of the patient. Eight age groups (0 – 15, 16 – 25, 26 – 54, 55 – 65, and 66 above) were defined for the calculation of age-specific rates. Crude, as well as age standardized rates per 100,000, were generated with a 95% confidence interval. The population estimates were obtained from the Pakistan Bureau of Statistics. The prevalence and incidence rates for each cancer type were calculated for individual genders as well as the overall population and regression analysis was performed with a 95% confidence interval.

RESULTS

The data showed that in Punjab, the cancer cases were increasing rapidly during the study period. In 2010, the number of reported cases was 2377, 431, 724, 337, and 307 for breast, prostate, head and neck, cervical and colorectal cancer respectively which were increasing continuously till the end of the study period i.e. 2016 as shown in Figure 1.

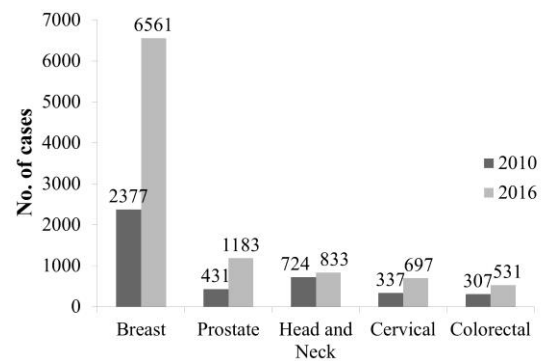
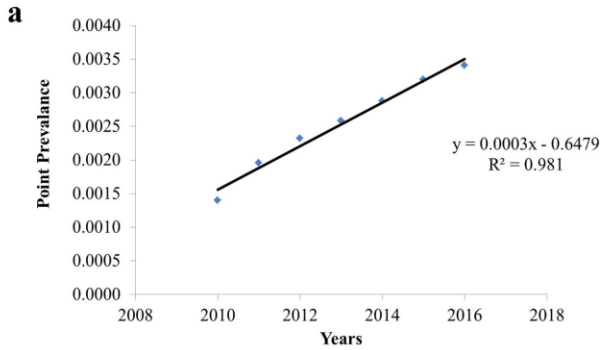


Figure 1: Comparison of reported cases of breast, prostate, head and neck, cervical and colorectal cancer in Punjab, Pakistan in 2010 versus 2016.

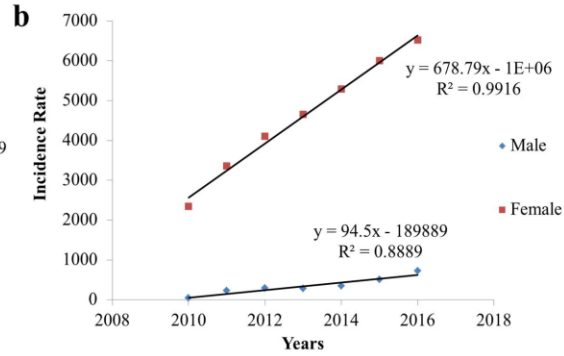
Trends in Breast Cancer

Age and gender appeared to be strong factors in this cancer and women above the age of 45 years were most affected. The prevalence and incidence rate increased linearly throughout the study

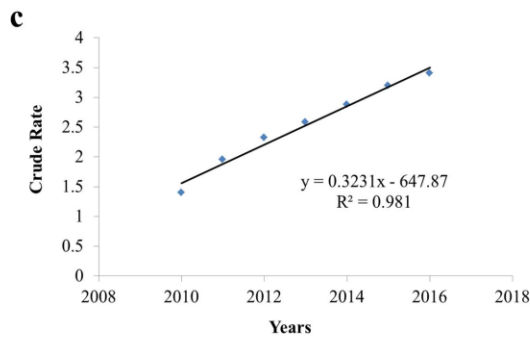
period (Figure 2a & 2b). The crude prevalence rate per 100,000 individuals (Figure 2c) showed a significant linear increase every year ($P < 0.001$). The age-specific rate (ASR) of prevalence per 1 million population of Punjab according to the 2016 census is shown in Figure 2d.



	Coefficients	Standard Error	t Stat	P-value
Intercept	-0.647873986	0.040503229	-15.99561307	1.73893E-05
Year	0.000323103	2.01208E-05	16.05812083	1.7059E-05



	Male				Female			
	Coefficients	Standard Error	t Stat	P-value	Coefficients	Standard Error	t Stat	P-value
Intercept	-0.001874	0.0003043	6.1579983	0.00164	-0.013292073	0.0008465	-15.700769	1.905E-05
Year	9.3273E-07	1.5118E-07	6.1696935	0.00162	6.62871E-06	4.2056E-07	15.761637	1.87E-05



	Coefficients	Standard Error	t Stat	P-value
Intercept	-647.8739856	40.50322941	-15.9956	1.74E-05
Year	0.323102549	0.020120819	16.05812	1.71E-05

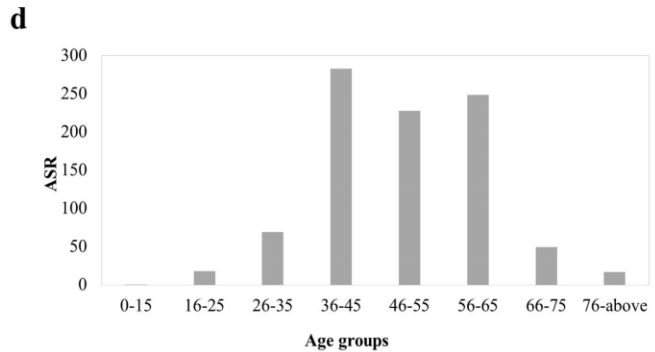


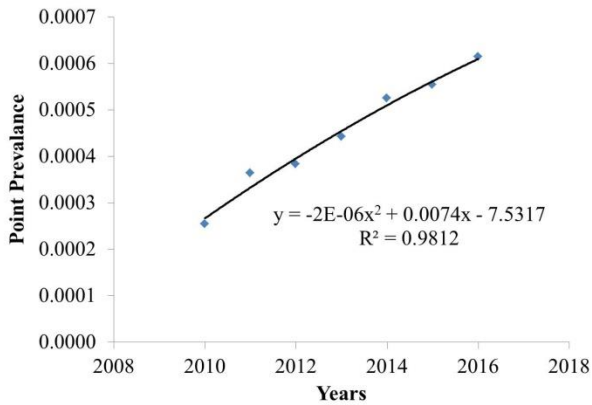
Figure 2: Trends in Breast cancer in Punjab, Pakistan from 2010 to 2016; (a) Point Prevalence percentage each year (b) Incidence rate in each year of study period (c) Crude prevalence rate per 100,000 population during the study period of 2010 to 2016 (d) Age-Specific Rate (ASR) of prevalence per million population.

Trends in Prostate Cancer

The male population aged above 60 years was more predisposed to this cancer. The prevalence and incidence rate increased linearly throughout the study period (Figure

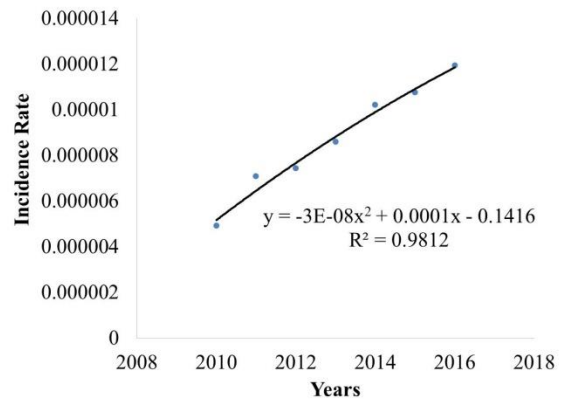
3a & 3b). The crude prevalence rate per 100,000 individuals (Figure 3c) showed a linear increase every year ($P < 0.001$). The age-specific rate (ASR) of prevalence per 1 million population of Punjab according to the 2016 census is shown in Figure 3d.

a



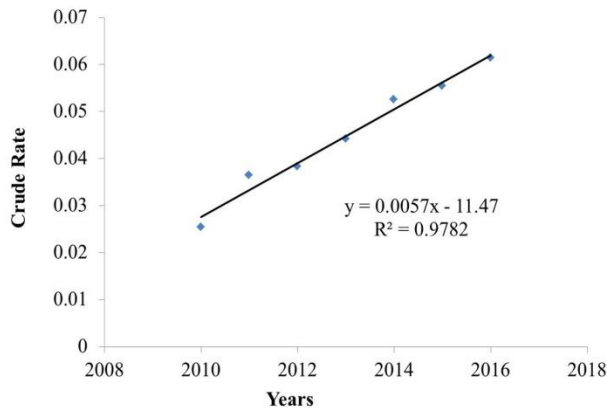
	Coefficients	Standard Error	t Stat	P-value
Intercept	-0.114695546	0.007694912	-14.90537406	2.45963E-05
Year	5.71998E-05	3.82261E-06	14.96355649	2.41307E-05

b



	Male			
	Coefficients	Standard Error	t Stat	P-value
Intercept	-0.002233501	0.000148855	-15.00457236	2.38088E-05
Year	1.11386E-06	7.39467E-08	15.0629678	2.33592E-05

c



	Coefficients	Standard Error	t Stat	P-value
Intercept	-11.46955459	0.769491228	-14.9053741	2.4596E-05
Year	0.00571998	0.000382261	14.9635565	2.4131E-05

d

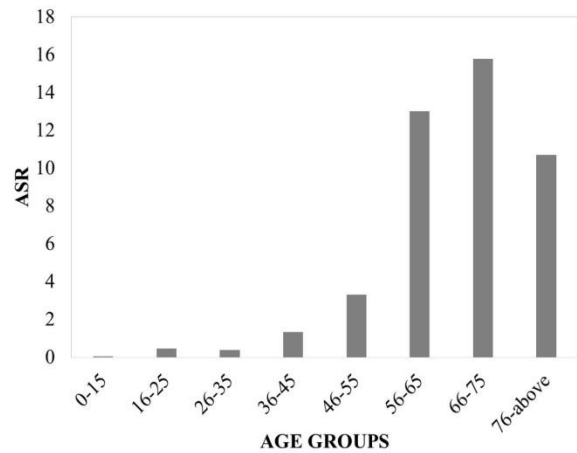
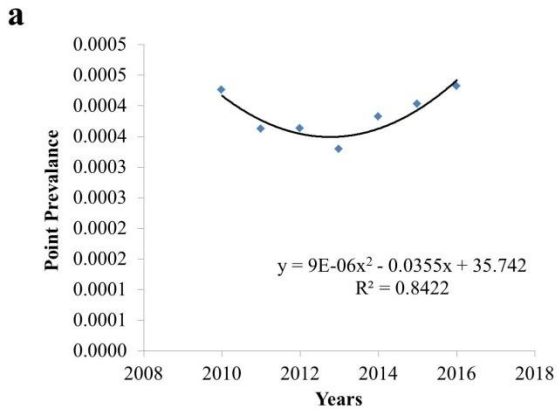


Figure 3: Trends in Prostate cancer in Punjab, Pakistan from 2010 to 2016; (a) Point Prevalence percentage each year (b) Incidence rate in each year of study period (c) Crude prevalence rate per 100,000 population during the study period of 2010 to 2016 (d) Age-Specific Rate (ASR) of prevalence per million population.

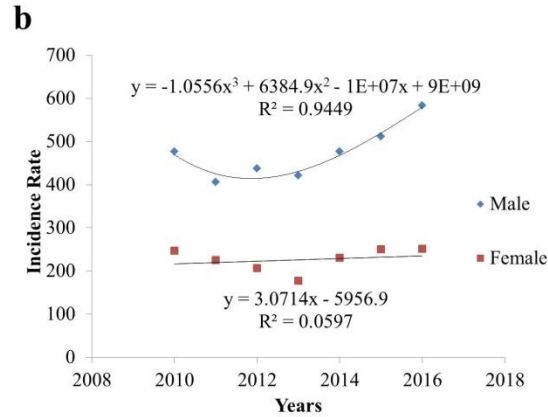
Trends in Head and Neck Cancer

The head and neck cancer cases were found in both genders. However, the number of male cases were much more as compared to females. The prevalence was almost similar during the study period (Figure 4a). Incidence rates for both genders are shown

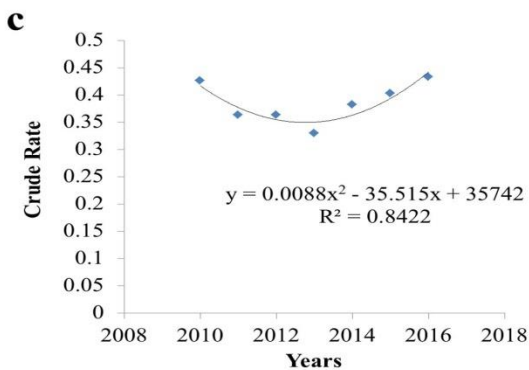
in Figure 4b. Crude prevalence rate per 100,000 individuals (Figure 4c) showed no significant difference through these years ($P < 0.001$). The age-specific rate (ASR) of prevalence per 1 million population of Punjab according to the 2016 census is shown in Figure 4d.



	Coefficients	Standard Error	t Stat	P-value
Intercept	-0.008092022	0.015079858	-0.536611257	0.614542703
Year	4.21115E-06	7.49123E-06	0.562143801	0.598283966



	Male				Female			
	Coefficients	Standard Error	t Stat	P-value	Coefficients	Standard Error	t Stat	P-value
Intercept	-0.0002112	0.00018615	-1.1347	0.30795	4.85363E-05	0.000125577	0.386506	0.715
Year	1.07441E-07	9.24758E-08	1.16182	0.29774	-2.2841E-08	6.23832E-08	-0.36614	0.729



	Coefficients	Standard Error	t Stat	P-value
Intercept	-8.09202	15.07986	-0.53661	0.614543
Year	0.004211	0.007491	0.562144	0.598284

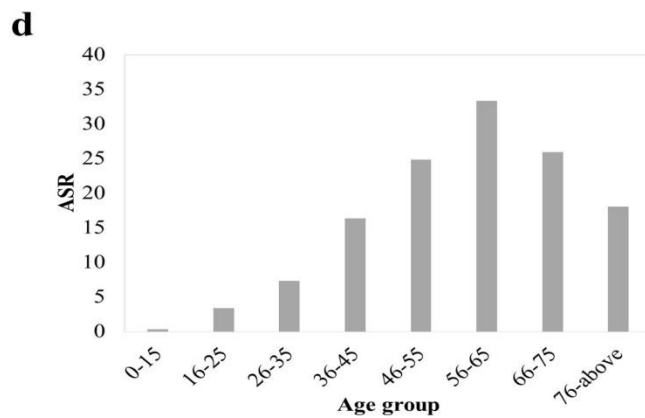


Figure 4:Trends in Head and neck cancer in Punjab, Pakistan from 2010 to 2016; (a) Point Prevalence percentage each year (b)Incidence rate in each year of study period (c) Crude prevalence rate per100,000 population during the study period of 2010 to 2016 (d) Age-Specific Rate (ASR) of prevalence per million population.

Trends in Cervical Cancer

Females above the age of 40 years were most affected by this cancer. The cervical cancer cases rates were fluctuating during the study years and point prevalence showed a polynomial relationship ($P < 0.05$) as shown in Figure 5a. The incidence rate

for cervical cancer is shown in Figure 5b and the crude prevalence rate per 100,000 individuals in the study years ($P < 0.001$) is shown in Figure 5c. Figure 5d shows the age-specific rate (ASR) of prevalence per 1 million population of Punjab according to the 2016 census.

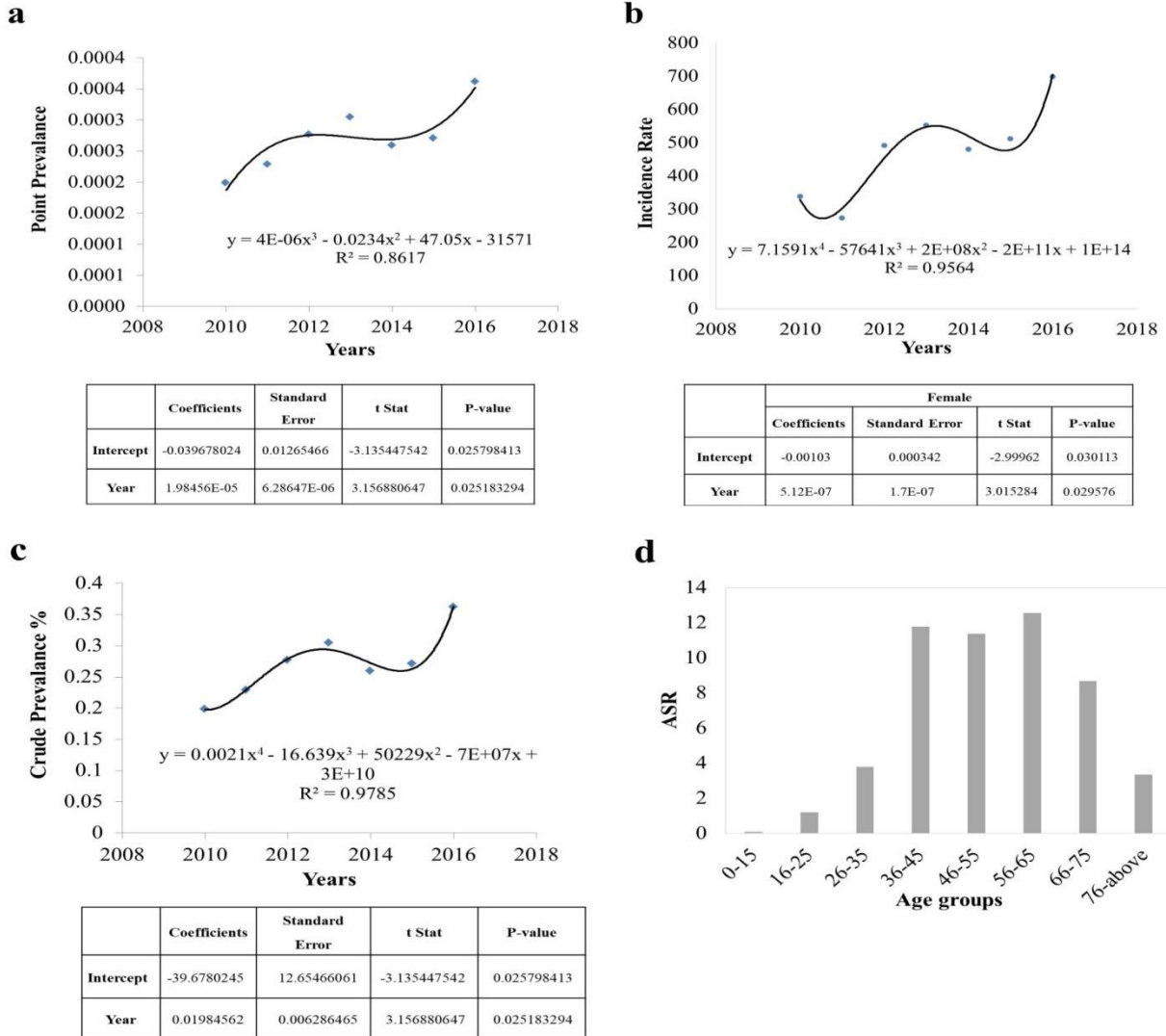


Figure 5: Trends in Cervical cancer in Punjab, Pakistan from 2010 to 2016; (a) Point Prevalence percentage each year (b) Incidence rate in each year of study period (c) Crude prevalence rate per 100,000 population during the study period of 2010 to 2016 (d) Age-Specific Rate (ASR) of prevalence per million population.

Trends in Colorectal Cancer

Colorectal cancer was found in both genders with ages above 45 years. The prevalence and incidence rate increased almost linearly throughout the study period for both genders (Figure 6a & 6b). The

crude prevalence rate per 100,000 individuals (Figure 2c) showed increase every year ($P = 0.05$). The age-specific rate (ASR) of prevalence per 1 million population of Punjab according to the 2016 census is shown in Figure 6d.

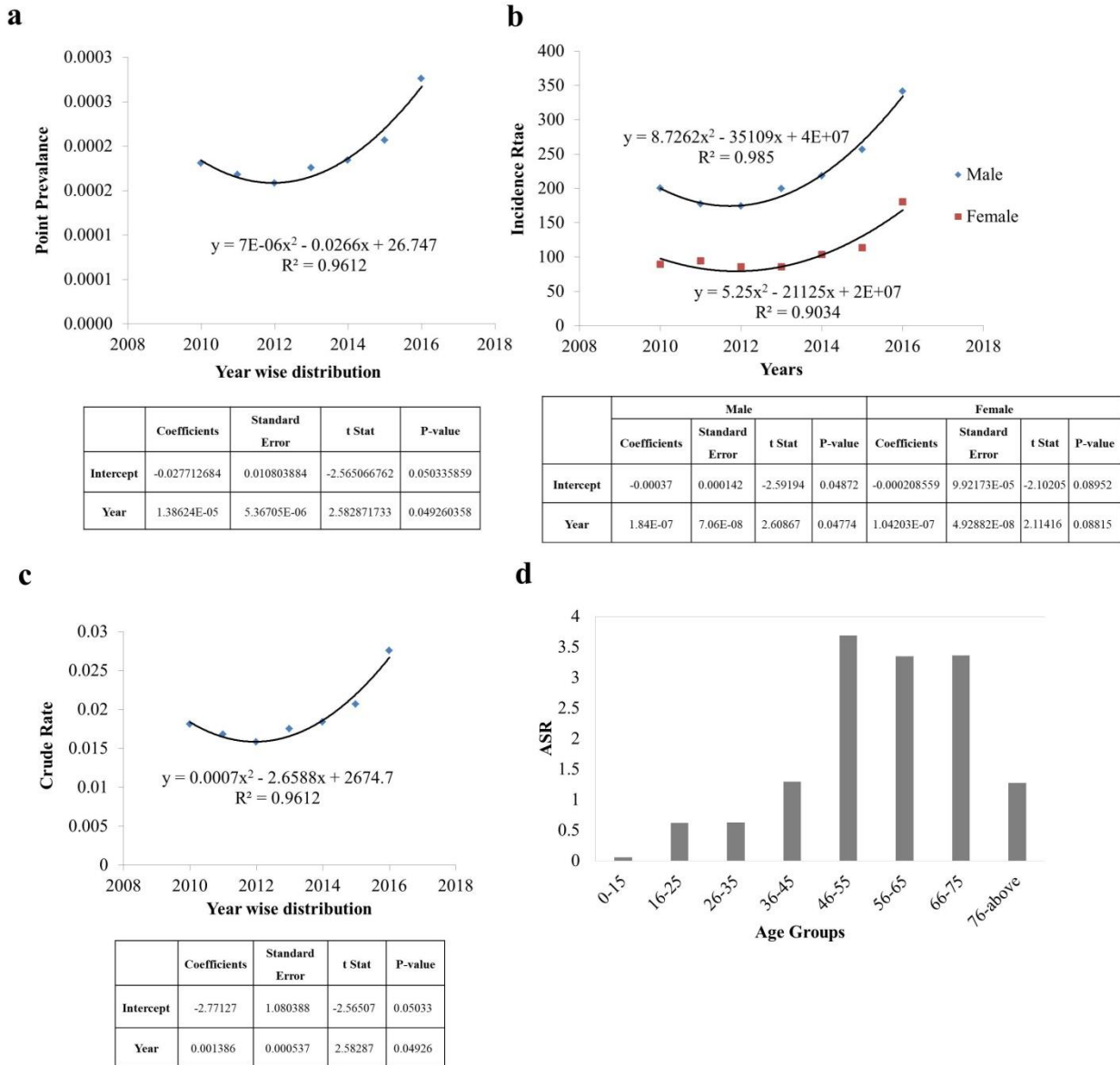


Figure 6: Trends in Colorectal cancer in Punjab, Pakistan from 2010 to 2016; (a) Point Prevalence percentage each year (b) Incidence rate in each year of study period (c) Crude prevalence rate per 100,000 population during the study period of 2010 to 2016 (d) Age-Specific Rate (ASR) of prevalence per million population.

DISCUSSION

Punjab is the largest province of Pakistan by population. The health profile indicators of this area do not show a good picture because of poverty, low level of education and lower expenditure on health facilities as 70% of the population is in rural areas according to the reports of Punjab specialized health and medical care department (Punjab Health Profile, n.d.). Compromised standards of living and inadequate health facilities of the area make people vulnerable to many different diseases.

Cancer incidence is increasing worldwide but the situation is worse in countries like India, Sri Lanka, Bangladesh and Pakistan (Varshitha, 2015; Shield et al., 2017). Various reports show the alarming rate at which cancer is increasing in the population of Pakistan (Bhurgri, 1998; Akram et al., 2013; Begum, 2009; Sarwar and Saqib, 2017). Due to the absence of a proper registry system of cancer cases in Pakistan, it is not possible to have developed an efficient management strategy for the disease. Through this study, an effort is made to get knowledge of a clear scenario for the prevalence and incidence rates of five major cancers in Punjab region which can provide a foundation for the development of efficient health policy to utilize the resources properly and to counter the effects of this deadly disease.

For this study, the data was collected from different hospitals of Punjab i.e. CENUM (Center for nuclear medicine, Mayo Hospital Lahore), GINUM (Gujranwala institute of nuclear medicine), PINUM (Punjab Institute of Nuclear Medicine, Faisalabad) and SKMCH (*Shaukat Khanum Memorial Cancer Hospital and Research Centre*). The data obtained were analysed for age and gender distribution of five common cancers

i.e., breast, prostate, head, and neck, cervical, and colorectal. The prevalence, incidence rate, and age-standardized rate were also calculated for each cancer type from the year 2010 to 2016.

According to this study, Breast cancer has the highest occurrence in the population of Punjab although it is most common among females. Pakistani women suffer the highest incidence rate than all Asian population and it is equivalent to one in every nine case (Menhas and Umer, 2015). *Shaukat Khanum Memorial Cancer Hospital* reported recently that the rate of incidence of breast cancer was 21.5% in both genders and for female patients, it was 45.9% (Badar et al., 2015). The prevalence rate was increasing throughout the period with more new cases appearing each year. This drastic increase in breast cancer cases every year is may be due to the changing lifestyles, decreasing tendency to breastfeed, unnecessary use of oral contraceptives, obesity, nulliparity, and first pregnancy at a later age (Asif et al., 2014).

Prostate cancer was found to be second-highest cancer in Punjab and the first common cancer in males. Ahmad et al. (2009) also reported it as a commonly occurring cancer in the male population and accounted for 7% of malignant male neoplasms (Ahmad et al., 2009). It was also shown that the rate of incidence (IR) of prostate cancer increased with age, specifically above 56 years. The probability of developing prostate cancer in males who were less than 39 years old was 0.005%, 2.2% for those aged between 40-59 years of age, and 13.7% among males between the ages of 60-79 years (Stangelberger et al., 2008). With the increase of age, the incidence rate of prostate cancer also increased specifically above the age of 60 (Pourmand et al., 2007). Prostate cancer was ranked as the fourth prevalent malignancy in the male population of Karachi, the city of

Pakistan, during 1998-2002 with an age-standardized incidence rate of about 10.1 for every 100,000 males and 67.4 of mean age (Bhurgri et al., 2009). This trend was the same as that of the Asia-Pacific region (9.9 for each 100,000). However, it was much less than the global rate (32.8 for each 100,000) (Baade et al., 2013).

The third most common cancer type found in Punjab in this study was head and neck cancer. It is ranked in the top ten cancers prevalent in Asia. However, there is an increased malignancy in Sri Lanka, Bangladesh, India and Pakistan where it ranked among the top three most prevalent cancers (Varshitha, 2015). It was demonstrated in this study that this cancer is prevalent in both genders and the number of cases fluctuated every year. The high prevalence and incidence rates of this cancer can be attributed to the use of tobacco in the form of smoking and chewing betel leaf, areca nut and other carcinogens. Poor dental hygiene and visits to the quacks can also be common contributors because of the lower economic status of people. The involvement of these factors towards the development of cancer has also been reported before in different populations (Emslie et al., 2002; Niaz et al., 2013). Age also seemed to contribute towards this cancer and people above 60 years were noted to be more susceptible to it in India (Ajay et al., 2018).

Cervical cancer was reported to be common in Punjabi women aged above 40 years. The prevalence rate of this cancer was not very high as also reported by other sources in Pakistan (Ali et al., 2010). The possible explanation for the lower occurrence is ethnic and religious practices which might play a defensive role for cervix cancer in these females contrary to established risk factors such as the increased prevalence of sexually transmitted diseases and multiple sexual partners.

Colorectal cancer was also observed in both genders with age above 45 years. However, the prevalence was quite low as compared to other cancers. Males were found more susceptible than females, possibly due to dietary habits. This cancer has also been reported to be more prevalent in males than females in previous studies (Dehkordi et al., 2009; Ahmad and Khan, 1991).

CONCLUSION

In conclusion, the present study provides comprehensive information about the prevalence of various cancer types in Pakistan. It is recommended that the health policymakers should take into consideration these trends while planning future strategies and this also highlights the importance of a national cancer registry where all the cases should be reported.

CONFLICT OF INTEREST

None to declare.

REFERENCES

- Ahmad M, Khan AH and Mansoor A (1991). Pattern of malignant tumours in northern Pakistan. *J Chin Med Assoc.*, 41 (11): 270-273.
- Ahmad Z, Qureshi A, Idrees R and Aftab K (2009). Prostatic carcinoma: a Pakistani perspective. *Asian Pac J Cancer Prev.*, 10 (2): 323-324.
- Ali SF, Ayub S, Manzoor NF, Azim S, Afif M, Akhtar N, Jafery WA, Tahir I, Hasnain SF and Uddin N (2010). Knowledge and Awareness about Cervical Cancer and Its Prevention amongst Interns and Nursing Staff in Tertiary Care Hospitals in Karachi, Pakistan. *PLoS One.* 5(6): e11059. <https://doi.org/10.1371/journal.pone.0011059>.

- Ajay PR, Ashwinirani SR, Nayak A, Suragimath G, Kamala KA, Sande A and Naik RS (2018). Oral cancer prevalence in Western population of Maharashtra, India, for a period of 5 years. *J Oral Res Rev.*, 10 (1):11.
- Akram S, Mirza T, Mirza MA and Qureshi M (2013). Emerging patterns in clinicopathological spectrum of oral cancers. *Pak J Med Sci.*, 29 (3): 783–787.
- Asif HM, Sultana S, Akhtar N, Rehman, JU and Rehman RU (2014). Prevalence: risk factors and disease knowledge of breast cancer in Pakistan. *Asian Pac J Cancer Prev.*, 15 (11):4411–4416.
- Baade PD, Youlten DR, Cramb SM, Dunn J and Gardiner RA (2013). Epidemiology of prostate cancer in the Asia-pacific region. *Prostate Int.*, 1 (2): 47-58.
- Badar F, Mahmood S, Faraz R, Yousaf A, Quader AU and Asif H (2015). Epidemiology of breast cancer at the Shaukat Khanum memorial cancer hospital and research center, Lahore, Pakistan. *J Coll Physicians Surg Pak.*, 25 (10): 738-742.
- Begum N, Naheed G, Nasreen S and Khan A (2009). Oral cavity cancers in north-west Pakistan: A hospital-based study. *J Postgrad Med Inst (Peshawar-Pakistan).*, 23 (1): 28-34.
- Bhurgri Y, Kayani N and Pervez S (2009). Incidence and trends of prostate cancer in Karachi South, 1995-2002. *Asian Pac J Cancer Prev.*, 10: 45-8.
- Bhurgri Y, Rahim A, Bhutto K, Bhurgri A, Pinjani PK, Usman A and Hassan SH (1998). Incidence of carcinoma of the oral cavity in Karachi-District South. *J Pak Med Assoc.*, 48: 321-324.
- Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA and Jemal A (2018). Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: Cancer J Clin.*, 68 (6): 394-424.
- Dehkordi BM, Safaee A and Zali MR (2009). Comparison of colorectal and gastric cancer: survival and prognostic factors. *Saudi J Gastroenterol.*, 15 (1):18–23.
- Emslie C, Hunt K and Macintyre S (2002). How similar are the smoking and drinking habits of men and women in non-manual jobs? *Eur J Public Health.*, 12 (1): 22-28.
- Global Cancer Observatory (https://gco.iarc.fr/tomorrow/graphic=isotype?type=1&type_sex=0&mode=population&sex=0&populations=900&cancers=39&age_group=value&apc_male=0&apc_female=0&print=0)
- Ma X and Yu H (2006). Cancer issue: global burden of cancer. *Yale J Biol Med.*, 9 (3-4):85.
- Menhas R and Umer S (2015). Breast Cancer among Pakistani Women. *Iran J Public Health.*, 44 (4): 586-87.
- Niaz MO, Naseem M, Siddiqui SN and Khurshid Z (2013). An outline of the oral health challenges in “Pakistani” population and a discussion of approaches to these challenges. *J Pak Dental Assoc.*, 21(3).
- Pourmand G, Salem S and Mehrsai A (2007). The risk factors of prostate cancer: a multicentric case-control study in Iran. *Asian Pac J Cancer Prev.*, 8: 422-8.
- Punjab Health Profile (n.d.). Specialized Healthcare & Medical Education Department, Government of the Punjab. Retrieved from; <https://health.punjab.gov.pk/PunjabHealthProfile.aspx>

- Sarwar MR and Saqib A (2017). Cancer prevalence, incidence and mortality rates in Pakistan in 2012. *Cogent Med.*, 4 (1):1288773. <https://doi.org/10.1080/2331205X.2017.1288773>
- Shield KD, Ferlay J, Jemal A, Sankaranarayanan R, Chaturvedi AK, Bray F and Soerjomataram I (2017). The global incidence of lip, oral cavity, and pharyngeal cancers by subsite in 2012. *CA: Cancer J Clin.*, 67(1):51-64.
- Stangelberger A, Waldert M and Djavan B (2008). Prostate cancer in elderly men. *Rev Urol.*, 10 (2):111.
- Torre LA, Bray F, Siegel RL, Ferlay J, Lortet-Tieulent J and Jemal A (2015). Global cancer statistics, 2012. *CA: Cancer J Clin.*, 65 (2): 87-108.
- Varshitha A (2015). Prevalence of oral cancer in India. *J Pharm Sci Res.*, 7 (10): 845.