A Survey on Oral Cancer Analysis among Hospitalized Patients Based Bioinformatics

G. Shruthi[1*], J. Madhusudhanan[2]

[1]Dept. of Computer Science & Engineering, Sri Manakula Vinayagar Engineering College, Puducherry, India
[2]Sri Manakula Vinayagar Engineering College, Puducherry, India

*Corresponding Author:*gshruthiprincess@gmail.com

Abstract— Recent technologies and developments on bioinformatics emphasize for analysis of the biological data which is generated by the biological sciences and biotechnology. Definition of Bioinformatics is used to storage, manipulation and interpretation data of nucleic acids and amino acids and molecular rules and system that affects the structure. Cancer is a major and serious public health problem worldwide. Cancer is uncontrolled proliferation of cells that arise from virtually any cell type in the body. This paper discusses about the cancer symptoms, analysis and the preventing measures. However, additionally, there are even more discussion about oral cancer among hospitalized patients. This paper discusses the levels of preventing oral cancers and characteristics of patients is directed to get a better understanding of the existing research problems in this emerging field.

Keywords— Nucleic acids, Amino acids, Oral Cancer Levels, Preventing measures of Cancer patients, Applications of Bioinformatics.

I. BACKGROUND

Bioinformatics is the collection of science and analyzing the complex biological data using computers especially as applied to genetic codes. Bioinformatics is to combine skills from biology and information technology is help to gather and analyze the complex data related to genetic mapping. It develops an algorithm and software tool to analyze and record the biological data of complex biological data by using interdisciplines field. Interdisciplines field is the combination of two or more fields into single activity. In other words, Interdisciplines field combined science with other interest such as Business and social science.

Bioinformatics is parallel growth to the development of DNA sequencing functions. Using this bioinformatics concept in biological field because of solving the complex biological approach such as Gene, DNA, RNA and is to develop the software tool to record the data on the computer. Proteins is to build the relationship between multiple proteins, sequence, functions. A genetic database is a pair of genetic data that contains genes, gene products and variants that is stored together in software to retrieve the genetic data and enhance the information from the data.

Genomics is define as the molecular characterization of whole genomes. Structural genomics is the field of genomics that includes the characterization of genome structure. It includes the genetic mapping, physical mapping and sequencing of genomes. It defined by 3-Dimensional structure such as DNA, protein which is encoded by a given genome. Goal is to identify the novel protein folds.

II. ORAL CANCER

National Cancer Informatics(NCI) has played a leading role in the science of genomics, proteomics, metabolomics to increase our understanding of the molecular basis of cancer. Cancer is a major and serious public health problem worldwide. Cancer is uncontrolled proliferation of cells that arise from virtually any cell type in the body. Cancer symptoms and signs depend on the specific type and grade of cancer, although general signs: fatigue, weight loss, pain, skin changes, change in bowel or bladder function, unusual bleeding, or voice change, fever, lumps, or tissue masses.

Oral Cancer is said to be the oral cavity which affects in the mouth. Cancer that develops in any part of the mouth. Also affects in the lips, the inside lining of the lips, cheeks, the teeth, the gums, the tongue and bottom of the lips. Oral cancer symptoms depends on grade of cancer, general signs: weight loss, unexplained bleeding in the mouth, difficulty speaking, ear pain, unexplained pain in any area of the face and mouth neck.

Epidemiology of oral cancer is one of the ten leading cancer in this world. Epidemiology of oral cancer, an increases the number of mouth cancer coverage to general specialist and teaching hospitals has been pragmatic. In the biology of oral cancer, it is now accepted that series of discrete events take place which eventually summate to form invasive neoplasm. During oral carcinogenesis, aetiological factors may damage cells at the level of DNA.

Precancerous lesions is defined as morphologically altered tissue in which cancer is more to develop than its normal part. Leukoplakia and Erythroplakia combines the important precancerous lesions. Leukoplakia is a white patch or plaque, that cannot be rubbed off and cannot be characterized clinically or histologically as any other kind of diseases.

Erythroplakia is a red patch that cannot be characterized histologically or clinically as due to any other conditions. Risk areas of oral cancer, floor of the mouth, lateral border of the tongue, lower buccal sulcus, alveolus.

Squamous cell carcinoma is most common type of cancer. Squamous cell carcinoma, tumors which is originate from the surface of the mouth. Submucous fibrosis is to generalized white discoloration of oral mucosa with progressive fibrosis, painful mucosal atrophy and restrictive fibrotic bands.

Squamous cell carcinoma of the mouth may also results from chronic irritation such as dental caries, chewing tobacco, floor of the mouth. Symptoms of oral lesions are lesions increases in size, pain, dysarthria, dysphagia.

III. RISK FACTORS

A Risk Factor is to increase the development of cancer cells. It could be a behavior of patients. Most of cancer are results of many risk factors which are discussed here., The risk of increasing oral cancer with the age of 45 and above 45years of age.

Tobacco is the major risk factors of intra oral carcinogen. It has been shown that smoking 40 or more cigarettes per day are 5 to 7 times more at risk of increasing cancer than non smokers. Signs of tobacco are persistent cough, shortness of breath, coughing up and blood, loss of weight, fatigue, loss of appetite. Small cell can be treated with chemotherapy and radiotherapy. Non small cell can be treated with surgery, chemotherapy, and radiotherapy depending on the stages. Continuing to smoke after treatment for oral cancer increases the risk of developing a second stage of oral cancer.

Alcohol is possibly acts as irritant or solvent which facilitates penetration of mucosa by other carcinogens like tobacco. It may also suppress efficiency of DNA repair often exposure to carcinogens. The cancer risk from alcohol consumption combined with tobacco smoking is multiplicative and is greater than either smoking or drinking alone. Greatly affects the mouth, pharynx, larynx and oesophageal cancers.

Diet and Nutrition based on deficiency of vitamin C, vitamin E, beta carotene is a precursor of vitamin A, has been linked to oral cancer. Adequate consumption of raw vegetables and fresh fruits gives a lower risk of oral and pharyngeal cancer. Mechanism of Diet and Nutrition is atrophy of oral mucosa membrane.

Fungal Infection is candida albicans has been implicated in oral squamous cell carcinoma. Also found in oral red and white patches with malignant potentials. Mechanism of fungal infection is the production of enzymes which produce genotoxic metabolites.

Ultraviolet light is the major risk factors of oral cancer. Morethan 30 percent of patients with cancer of the lip have outdoor occupations associated with prolonged exposure to sunlight.

HPV is defined as Human PapillomaVirus, is the most common viral infection of the reproductive tract. HPV are small, non enveloped, double stranded DNA viruses encased in a 72 sided icosahedral protein capsid. Many types of HPV are spread through sexual contact, including oral sex and they can infect the sexual organs.

Smokeless Tobacco is the major factors of cancer. Chew, snuff, plug, leaf, and dip are all forms of smokeless tobacco. it contains 28 cancer causing chemicals among them copenhagen is equal to three packets of cigarettes.

Smoking is a major cause of cancers of the oropharynx and bladder among women. Larynx and Esophagus cancer rates are also elevated. Research shows that smokers infected with human papillomavirus have greater risk of developing invasive cervical cancer than nonsmokers with the virus.

Cigarette smoking is the most common form of tobacco use, but all forms of tobacco are linked with increased risk of oral cancer: regular use of pipes, cigars, water pipes, as well as all forms of smokeless tobacco.

Poor oral hygiene, chronic candidiasis, herpes virus infections and immunosuppressive conditions. Example: HIV, Fanconi syndrome, the development of oral malignancy, but evidence is currently weak.

IV. PATIENT AND CLINICAL CHARACTERISTICS

The management of patients with oral cancer is complex. Patients' clinical characteristics were taken from hospital

administration records (i.e. tumor group and day case or inpatient status), self-reported (i.e. time since first treatment and response to treatment) and hospital trusts were categorized by foundation status. The study comes out peoples of 61 years of age, were male(81%) and female(20%) are infected by oral cancer. Behavioral risk factors, were assessed in the study population with 42 percent of patients identified as current smokers and 22 percent of patients identified as alcohol users. Only 11 percent of patients had been tested for HPV infection. This testing was performed more often in patients with oropharynx tumors than in patients with tumors in other parts of body.

Clinical features associated with an increased risk of malignant progression: lesion characteristics, surface texture (smooth and indurated), inhomogeneous aspects (hyperkeratosic, thick), colour (red coloured or speckled, extent, unifocal, multifocal or diffuse pattern). Lesion location in the mouth, i.e., tongue, floor of mouth. Patient risk factor assessment and detailed medical or systemic illness or cancer history and lesion histopathology.

A clinician ought to dependably make a careful clinical examination of the oral mucosa and mostly of those destinations that are particularly inclined, for example, the sides of the tongue and the floor of the mouth. Together with the oral depression it is prescribed to palpate the lymphoid tissue of the neck (cervical lymph hubs) to search for neck masses which can speak to metastases.

The clinical prologue of these early dangerous lesions is ordinarily as an erytholeukoplastic lesion. It comprises of red or red and white zones with a slight harshness and is very much separated. Ulcerative form is characterized by a raised external slope, separated from the inside with curved edges and a bottom containing necrotic debris. This ulceration has an indurated base. Ulceration is only the visible part of cancer.

Budding or vegetative form develops the tumor proliferation in bud. Ulcero-budding form develops the tumor cells in necrosis of the top of the bud giving ulceration. There are also fissure and nodular forms.

The general standpoint for patients determined to have oral squamous cell carcinoma (OSCC) stays poor, to a great extent because recently clinical presentation. Early lesions are much of the time undetected because of the absence of going with manifestations. Early acknowledgment, analysis and treatment of OSCC fundamentally upgrade quiet survival and limit the requirement for broad medical procedure called surgery.

V.   LEVELS OF PREVENTING ORAL CANCER

Prevention involves interventions aimed at eliminating, eradicating or minimizing the impact of the oral cancer. Primordial is used to avoid the emergence and establishment of the patterns of living that are known to contribute to an elevated risk of oral cancer.

The primary screening test for oral cancer is a systematic clinical examination of the oral cavity. According to the World Health Organization and the National Institute of Dental and Craniofacial. Primary is aimed to reduce the incidence of cancer cells and pre-cancer. It is aimed to reduce the number of new cases i.e., discourage smoking and alcohol consumption.

Secondary is aimed at detection of oral cancer at an early stage. Early detection, especially at the precancerous stage, offers a better prognosis with a better chance of cure. It focused on high risk individuals, are likely to be cost effective in LMICs. In general, secondary prevention was at ages of 35 or 40 years and older, included both high and average risk individuals. This secondary prevention is aimed to improve prognosis.

Tertiary is the last stage to treat oral cancer and its complications. Curing, Preventing death or Improving life quality.

VI.   DIAGNOSIS MANAGEMENT AND TREATMENTS

Diagnosis of oral cancer and pre-cancer depends on the medical and dental history and clinical examination supplemented by investigations. Any chronic oral lesions should be regarded with suspicion especially in an order patient or associated with any of the pre-cancerous lesions and conditions outlined below. Extra caution must also be taken if lesions is indurated, fixed, attached, to the underlying tissue, associated with lymphadenopathy.

Vital staining is a tolonium chloride(toluidine blue), a nuclear dye that has been applied to the mouth as an oral-rinse. This method is used for identification of clinically suspicious mucosal abnormalities and its useful way of demarcating the extent of a potentially malignant lesion prior to excision.

Endoscopy is a thin tube with a powerful light and tiny camera at the end. This method is used to identify the tumors inside a mouth. This thin tube is length and flexible. Biopsy is effective method to identify the cancer in the body. Doctors remove a small amount of tissues, that to examine under microscope.

Brush Biopsy used to designated circular brush called Oral CDX brush is to reach deeper layers of the oral epithelium. It employs the application of a brush to the lesion to collect a sample that includes not only superficial cells and also from the basal layer. This techniques have been developed as method of monitoring epithelial dysplasia and detecting squamous cell carcinoma.

The management of patients with oral cancer is complex. Manifestations of cancer therapy may include infections, mucositis and oral ulceration, xerostomia, bleeding, pain, osteoradionecrosis, taste loss, trismus, and caries. These require prevention and management.

Treatment strategies vary based on the stage of oral cancer at the time of diagnosis. Depending on the stage, treatment may include surgery or radiotherapy, which is leading to a high probability of long-term survival but often with considerable morbidity. Chemotherapy, including targeted therapy, may be combined with radiation in initial treatment or used to treat recurrent cancer. Immunotherapy is a newer option for advanced or recurrent cancer.

Most early stage oral cancer can be locally treated with radiotherapy, with no or minimal functional and physical morbidity. Radiotherapy is the preferred modalilty for patients with deep infiltrative tumors.

Radiographical examination is comes under clinical examinations. Radiographical examinations are OPG, CT scan, MRI for testing of primary site and regional lymph nodes. It's better to imagine to assess bony involvements and extension are CT scan, while imaging to assess extent of soft tissues spread and recurrent tumors are MRI.

Advantages of Radiotherapy are: Minimal esthetic and functional alteration and ability to sterilize microscopical tumor cells. Disadvantages are: ineffective to ablate large tumors volume, acute and chronic morbidity, and prolonged treatment.

Surgery is the preferred treatment of oral cancer. Radiotherapy is reserved for patients who are not willing for surgery or while surgery will cause significant cosmetic or functional defects.

VII.   CONCLUSION

From this paper we conclude that, many factors influence knowledge, attitudes and practices related to oral cancer. There should be a program to improve the training of dental auxiliaries, hygienists and dentists in preventing and controlling oral cancer, as has already been shown in other studies. If oral healthcare professionals do not play a major part in prevention and control, the situation of disadvantaged or poorer people worsens, because they are usually more exposed to preventable risk factors such as environmental carcinogenic substances, alcohol, infectious agents and tobacco use. These individuals likewise have little access to wellbeing and training administrations, accordingly the learning, mentalities and practices of experts are exceptionally molding.

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