



Chemoprevention of oral cancer using tretinoin biofilm - A review

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ABSTRACT

Oral cancer is a major disease prevalent all over the world. Oral squamous cell carcinoma (OSCC) is a well-known disorder that accounts for more than 90% of all oral cancers. Five percent of all tumors occur in the head and neck, and approximately half of those occur specifically pertaining to the oral cavity. Tretinoin biofilm is a cost-effective alternative method used in the chemoprevention of oral cancer. All relevant search engines (google scholar, PubMed, etc.) searched for the literature pertaining to oral cancer, chemopreventive methods and the use of Tretinoin 'biofilm' in oral cancer prevention. The data was collected, and quality analysis of the collected data was done. The knowledge in the current point of time analysed and thus the consensus was established. Oral cancer has proved to be a major disease with major health issues leading to morbidity and mortality among the patients. The treatment for oral cancer is expensive and invasive and hence cannot be approached by everyone, leading to unfortunate consequences. This technique if successful, has the potential to be employed worldwide to treat oral cancer patients leading to the betterment of health and lifestyle.



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INTRODUCTION

Oral cancer is a major disease prevalent all over the world. Oral squamous cell carcinoma (OSCC) is a well-known disorder that accounts for more than 90% of all oral cancers. Oral cancer is diagnosed

by the presence of other oral disorders such as lymphomas, sarcomas and metastasis etc. (Bagan *et al.*, 2010). Five percent of all tumors occur in the head and neck, and approximately half of those occur specifically pertaining to the oral cavity. According to recent data from the Epidemiology Program suggest that 28,900 new cases of oral cancer will be identified and 7400 deaths attributed to oral cancer each year in the United States (Kademani, 2007). Human papillomavirus (HPV) is considered to be the causative agent of cancers pertaining to the cervical region. Also, it appears to be involved in the etiology of cancers pertaining to the oral cavity and the region of the oropharynx. Herrero (2003) also concluded that the most common HPV (Human Papillomavirus) type in genital cancers (HPV16) was also the most common in these tumours. Petersen (2009) estimated that around 43% of cancer deaths are due to use of tobacco, unhealthy eating habits,

liquor/alcohol consumption, inactive lifestyles and infection. The study also states that people who have low annual income and disadvantaged groups are the ones who are more susceptible to unavoidable risk factors such as environmental carcinogens, infectious agents, and tobacco use etc. and thereby develop cancers pertaining to the oral cavity. Tretinoin biofilm is a cost-effective alternative method used in the chemoprevention of oral cancer. Traditional treatment of oral diseases is too costly in several industrialized countries, and not feasible in most low-income and middle-income countries (Morrison and Petersen, 2003).

There are numerous researches done in this field such as awareness-based studies (Palati et al., 2020; Uma et al., 2020), trial studies (Krishnan et al., 2018; Hannah et al., 2018), the prevalence of dental pathologies and its health effects (Gunasekaran and R, 2016; Ahad and Gheena, 2016), advanced studies on health disciplines (Sheriff and Santhanam, 2018; Prasanna and Gheena, 2016), morphological variation of tooth (Abitha and Santhanam, 2019; Harrita and Santhanam, 2019) age estimation studies (Palati et al., 2019), microbiologic variations and its effects (Sarbeen and Gheena, 2016), the prevalence of hypomineralization (Sukumaran and Padavala, 2018), pigmentation of the gingiva (Manohar and Abilasha, 2019), review based studies (Shree et al., 2019) etc. on many topics pertaining to the oral cavity, its anatomy and odontology. The aim of this review is to analyse the properties of tretinoin 'biofilm' and its use in the chemoprevention of oral cancer.

MATERIALS AND METHODS

All relevant search engines (google scholar, PubMed, etc.) searched for the literature pertaining to oral cancer, chemopreventive methods and the use of Tretinoin 'biofilm' in oral cancer prevention. The data was collected, and quality analysis of the collected data was done using the Health Evidence™ Quality Assessment tool and the data was displayed in a tabular column. (Table 1) The knowledge in the current point of time analysed and thus the consensus was established.

Chemoprevention

Chemoprevention is a new combined treatment which is safe and effective for treating carcinomas and in this case, oral carcinomas (Wang et al., 2004) It is used in people who are more likely to develop cancer in order to prevent the development of possible cancer attacks and eradicate it completely or at least to a certain extent (Scheer et al., 2004). Chemoprevention is the prevention of initiation, promotion

and progression of the possible carcinogenesis into mature developed cancer. It is considered to be a promising treatment strategy in treating oral carcinomas (Bodhade and Dive, 2013). Although, in some cases of cancer, it is proven to produce systemic toxic effects (Wang et al., 2003). Chemoprevention is an extensively studied strategy as it involves in diminishing the morbidity of cancer, and also significantly reducing the mortality associated with malignancy (Tanaka et al., 2011). There are supposedly three prevention levels in the chemoprevention of oral cancer, and they are primary prevention, secondary preventions and tertiary prevention (Scheer et al., 2004).

Oral cancer

Oral cancer is a worldwide known common malignancy (Wang et al., 2003). It is considered to be a global threat to public health and well being. 48% of cases are located in the oral cavity, and 90% of cases are intraoral carcinoma (Tanaka et al., 2011). According to the study by Parkin et al. (1988), states that more than 300,000 new and different cases of oral squamous cell carcinomas are diagnosed annually all over the world. A study states that the most common site for oral cancer is the tongue accounting to approximately 40% of all cases of oral cavity carcinomas and the floor of the mouth is deemed to be the second most common location for oral carcinoma attack (Tanaka et al., 2011). Oral cancer is broadly divided into two categories where one type is oral cancer that occurs in the oral cavity, and the other type is those occurring in the oropharynx region. Oral cancer grossly affects one out of 10,030 people, and it is also considered that men are twice more likely to acquire oral cancer. Arrived from the Epidemiology statistics in India for oral cancer (2018), it states that 64.8% for males 37.2% and for females are affected by oral cancer in the year 2018 alone (from epidemiology statistics 2018) (Sharma et al., 2018). According to an article by David Young et al. 2015, it is stated that there has been a steady decline in the number of tobacco and alcohol consuming related squamous cell carcinomas in the past 30 years however it is noticed that there is an increasing number of cases in human papillomavirus (HPV) related cancers. The article also tells that the overall survival rate for human papillomavirus positive cancer is significantly greater than for human papilloma virus-negative cancers as it is likely due to HPV positive cancers are considered to be more responsive to appropriate treatment and speedy recovery (Young et al., 2015).

Tretinoin

Tretinoin is a derivative of vitamin A and is con-

Table 1: Quality analysis of articles

Author Name and Year of Publication	Quality Analysis
Bagan <i>et al.</i> (2010)	Strong
Kademani (2007)	Moderate
Herrero (2003)	Strong
Morrison and Petersen (2003); Petersen (2009)	Strong
Wang <i>et al.</i> (2003, 2004)	Strong
Tanaka <i>et al.</i> (2011)	Moderate
Parkin <i>et al.</i> (1988)	Moderate
Young <i>et al.</i> (2015)	Strong
Rahman <i>et al.</i> (2016)	Moderate
Chau <i>et al.</i> (2017)	Moderate
Palati <i>et al.</i> (2020)	Moderate
Uma <i>et al.</i> (2020)	Strong
Krishnan <i>et al.</i> (2018)	Moderate
Hannah <i>et al.</i> (2018)	Moderate
Gunasekaran and R (2016)	Moderate
Ahad and Gheena (2016)	Moderate
Sheriff and Santhanam (2018)	Moderate
Prasanna and Gheena (2016)	Moderate
Abitha and Santhanam (2019)	Strong
Harrita and Santhanam (2019)	Strong
Scheer <i>et al.</i> (2004)	Strong
Sarbeen and Gheena (2016)	Strong
Sukumaran and Padavala (2018)	Strong
Manohar and Abilasha (2019)	Strong
Shree <i>et al.</i> (2019)	Strong
Gopinath <i>et al.</i> (2004)	Moderate

sidered essential for the treatment of certain skin conditions which includes acne, eczema, psoriasis, photo-aged skin, sunburns and various other skin related disorders. The drawbacks to tretinoin include its limited stability, loss during storage, its sensitivity to air, light and acids. Its poor stability is due to the direct exposure of actives to UV light (Rahman *et al.*, 2016).

Tretinoin is now a chemopreventive agent and is used in topical and systemic use. It is an attractive alternative to traditional methods of chemoprevention which is extensive and expensive. It is also supposedly known to reduce toxic effects from the treatment (Bodhade and Dive, 2013).

The advantage of this is that it reduces systemic side effects and also spares important anatomic structures of the body (Chau *et al.*, 2017). Tretinoin 'biofilm' patches are used in the chemoprevention of oral cancer. Z Wang *et al.* 2003, proved the tretinoin 'biofilm' patch technique is successfully used for chemoprevention in hamster model (Wang

et al., 2003).

Technique used

Tretinoin is delivered using two carrier methods. One of the carriers which help in delivering tretinoin is Ascorbyl palmitate vesicles (Gopinath *et al.*, 2004). Another technique is the Polymer MAF (Mucosal Adhesive Film) technique is also used in delivering tretinoin in the chemoprevention of oral carcinomas. It is deemed to be a safe and effective way to deliver tretinoin (Wang *et al.*, 2003).

CONCLUSION

Oral cancer has proved to be a major disease with major health issues leading to morbidity and mortality of lives. The treatment for oral cancer is expensive and invasive and hence cannot be approached by everyone, leading to unfortunate consequences. In order to make the treatment for preventing oral carcinomas pocket-friendly and reachable to all, cost-effective and less invasive treatment methods such as topical chemoprevention using tretinoin

'biofilm' could be a great alternative to systemic medication which involves extensive procedures such as harmful radiations etc. In-depth research in this field, if successful, promises to be a breakthrough in the chemoprevention of oral cancer. This technique if successful, has the potential to be employed worldwide to treat oral cancer patients leading to the betterment of health and lifestyle.

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Conflict of Interest

All the authors declare no conflict of interest in the study.

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