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TREND OF SKIN CANCER OVER NORTHERN REGIONS OF INDIA - IT'S POSSIBLE CAUSES AND REMEDY

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Abstract

Some Indian regions are seeing a gradual rise in skin cancer. The aim of the paper is to determine possible causes and solutions . The results of critical analysis and potential explanations are offered.

Keywords: *skin cancer, ozone depletion, UV radiation, Melanoma, Non-melanoma*

1. Introduction

It is generally known that both hereditary and environmental factors contribute to the development of cancer. Our main concern is how the environment affects human health and contributes to the deadly disease known as cancer. According to reports, skin cancer cases are rising in some parts of India. It is also generally known that skin cancer cases are most common in western nations, but now it is reported that skin cancer cases are rising in some parts of India also.

It is well known that cancer is serious disease which may causes death also. There are basically two typesof skin cancer.

1. Melanoma skin cancer- Serious type of cancer

2. Non melanoma skin cancer- Not so serious type cancer

Laboni et al. [1] reported that the north area of India had the highest AAR(Age adjusted cancer) per 100,000 for both males and females, at 1.62 and 1.21, respectively, for melanoma. The north-east area had the highest incidence of nonmelanoma of the skin or other skin malignancies in men (6.2), while the Northeast had the highest incidence in women (3.49). The northeast region has the highest frequency of nonmelanoma in both the male (75.6) and female (43.6) sexes. It is also well established that The Western Pacific region had the greatest AAR of melanoma in men (36.7), whereas the European region had the highest AAR in women (31.7). The Western Pacific area had the greatest incidence of nonmelanoma of the skin or other skin malignancies in men, with 225.4 and 68.6 for females. Again Lal et al. [2] reported that Skin cancer made up 84 patients out of 2638 who registered had cancer of any kind. It is nearly 3.18% and the patients' ages, which ranged from 27 to 92 years old. The most frequent histological type was basal cell carcinoma (BCC), which was followed by squamous cell carcinoma (SCC) (31/84, 36.91%) and malignant melanoma (MM) (7/84, 8.33%). The ratio of men to women was determined to be 0.79:1. In the BCC, there were more women overall (p 0.05). The most often implicated region was the head and neck (p 0.05). Most patients (88%) came from rural areas. 92%

of the patients had worked in agriculture directly and had a history of prolonged sun exposure. Deyal, N et al.[3] reported that the earth's atmosphere is significantly impacted by total column ozone (TCO), particularly in the Himalayan region. It is necessary to present a thorough investigation of TCO trend analysis and related effects in the Himalayan atmosphere. They look at data statistically. TCO fluctuation over Uttarakhand, India, region of the Himalayan environment by analysing the daily TCO dataset of the previous 15 years (2005-2019). Obtained results indicate that TCO values are at peak during the spring season whereas it shows the least value during the winter season over Uttarakhand. Laschewski, G et al. [4] presented consideration to other nations. According to their analysis, there is an increasing need for adaptability to the related hazards to human health. An impact-related approach based on satellite data was used to analyse the long-term occurrence (1983–2019) of low-ozone events (LOEs) with accompanying near-surface anomalies of erythema-effective UV irradiation at four locations in Germany (Sylt, Berlin, Frankfurt, and Munich). Purpose of the paper is to find the possible explanation for the increase of this disease over north east region of Himalayan belt. Some scientific suggestions are also offered.

2. Data and methodology

Data of cancer patient collected from J Clin Diagn Res. 2016 Jun; 10(6):PC12-5. DOI: 10.7860/JCDR/2016/18487.8051.

TCO(Total Column Ozone) data is collected from NASA data source http://gml.noaa.gov

Graphical analysis is done to draw particular conclusion

3. Result and discussion

It is reported from A Tertiary care hospital over Malwa region of Punjab that trend of skin cancer is increasing. Different regions of Punjab is shown in Figure 1.

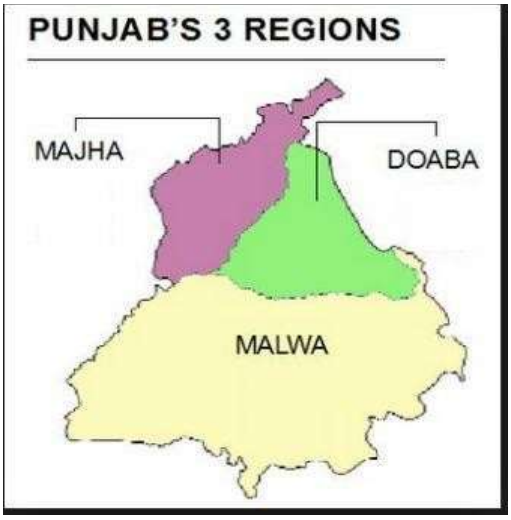

Figure 1 Different regions of Punjab

An increasing trend of skin cancer patient is observed over north India around Punjab during the year 2012 to 2014.Distribution of skin cancer patient for both male and female over different northern regions of India is shown in Figure 2. It is clear that relative proportion of male melanoma skin cancer patient is greater than female.

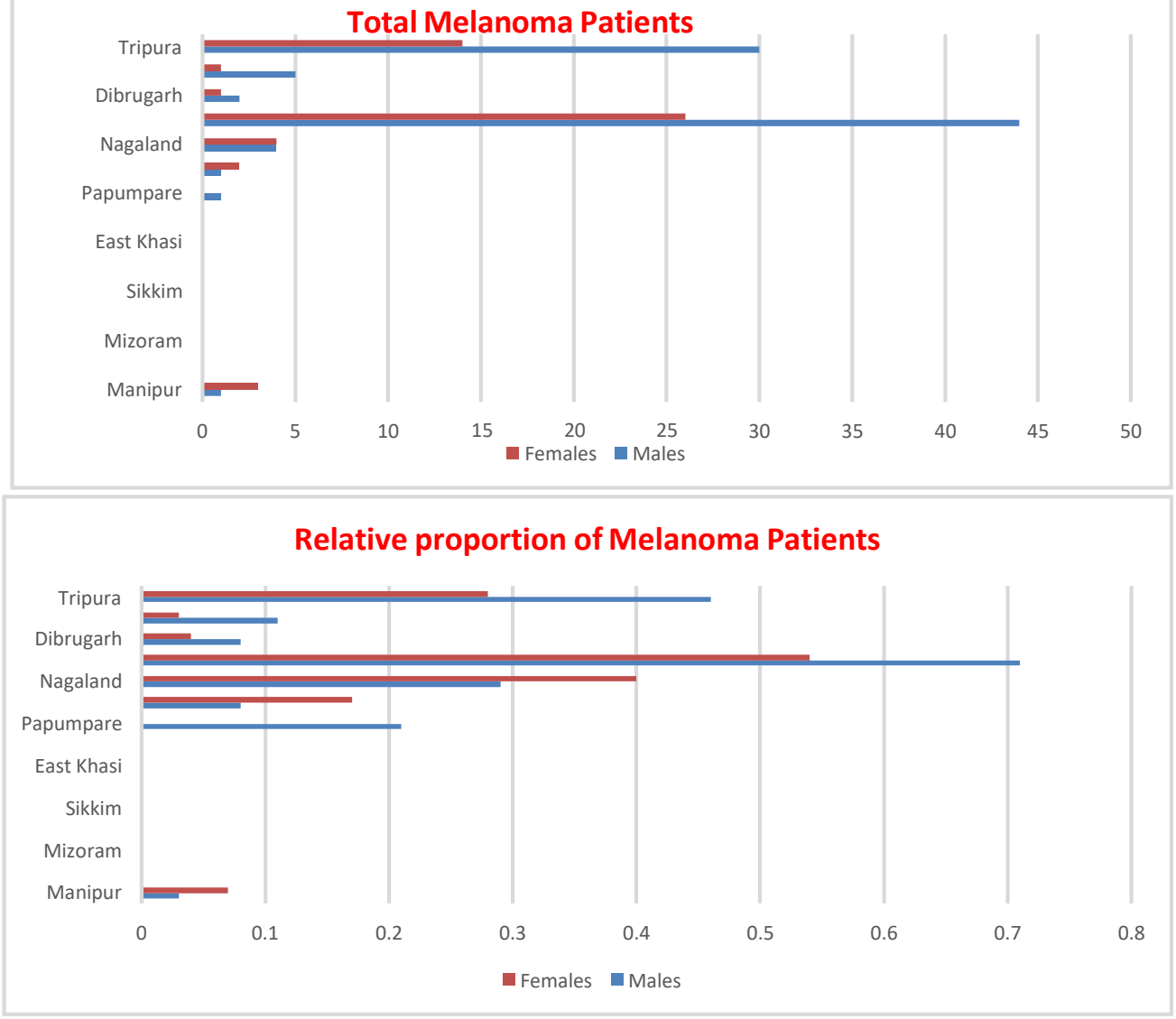

Figure 2 Distribution of melanoma male and female skin cancer patient over northern India

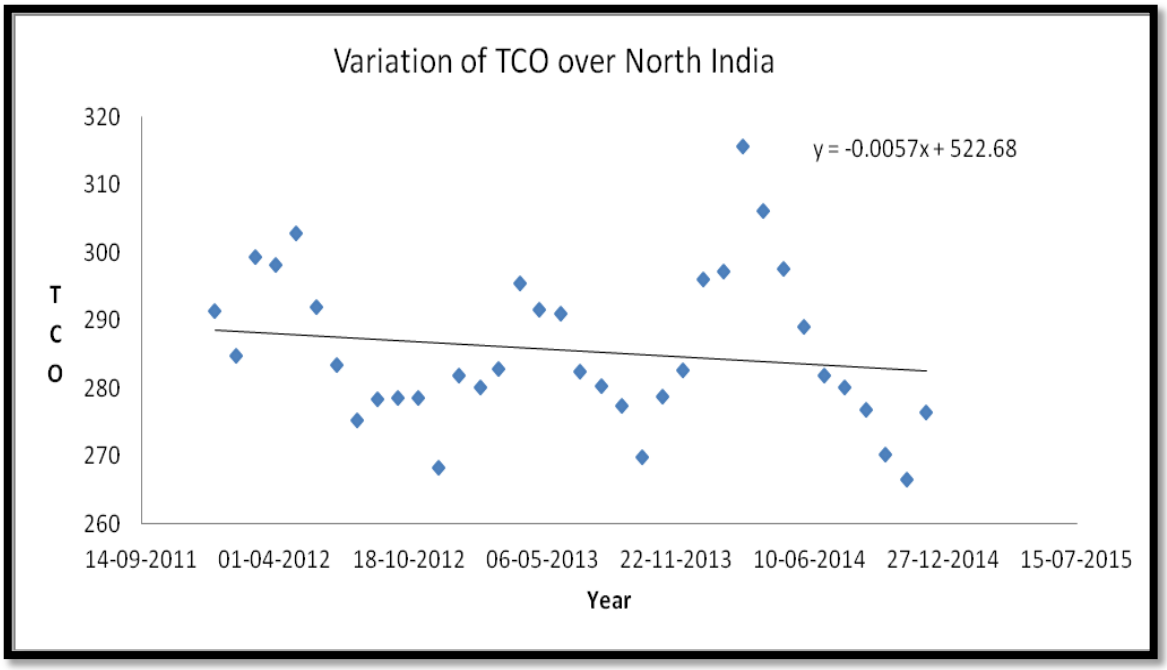

Figure 3 TCO (Total Column Ozone)variation over Northern India

TCO variation over the same region for the same period is also carried out and shown in Figure 3.Graphical representation of TCO clearly shows that TCO is decreasing in north region of Punjab.90% of total ozone lies in the stratosphere and only 10% lies in the troposphere. Dangerous solar UV ray is absorbed by stratospheric ozone layer. Decrease of TCO is mainly due to decrease of stratospheric ozone. According to hospital data 2012 to 2014, the skin cancer rate is increasing for both melanoma and other types. TCO data for the region is also collected from NOAA wave-site [5]. TCO variation over the same region for the same period is shown in Figure 3. TCO clearly follows decreasing trend for the same period. Total solar spectrum is shown in Figure 4.

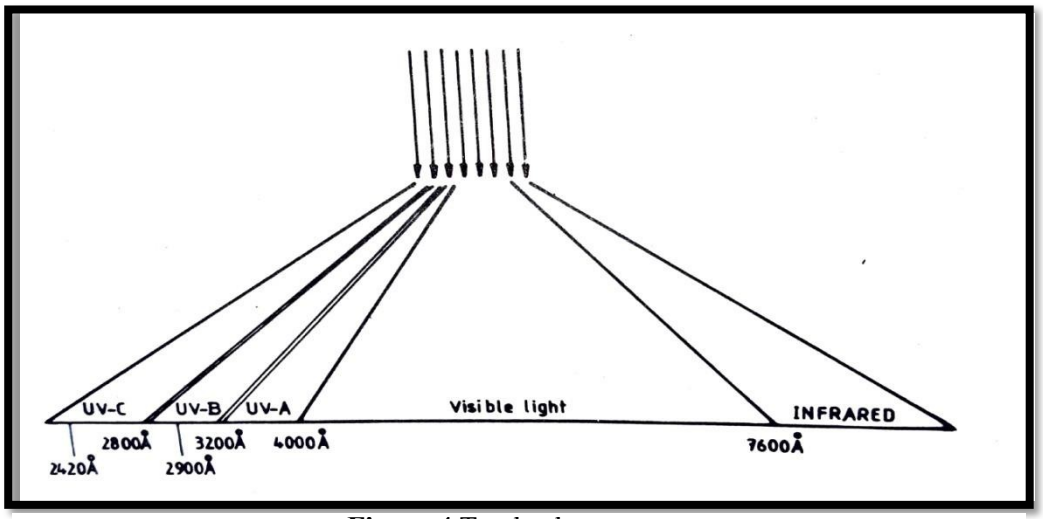

Figure 4 Total solar spectrum

UVA have the longest wavelengths, followed by UVB, and UVC rays which have the shortest wavelengths. UVA is not affecting human beings. Dangerous UVC is totally absorbed by ozone layer. The shortest wavelength the UV radiation is most harmful than other radiations. However, lucky for us, UVC isn't able to penetrate earth's atmosphere. This region is totally absorbed by ozone layer. UV B is also dangerous one. UVB radiation causes sunburn, darkening and thickening of the outer layer of the skin and can produce skin cancer. It is now coming partly to earth surface due to decrease of ozone concentration.

It is now well established that ozone hole is created over Antarctica. Farman et al.[6] first reported that dramatic decrease of ozone concentration takes place over Antarctica. Afterwards, it was verified by different investigators throughout the world. It is quite expected that this will play significant role to control global ozone concentration. Dangerous Solar UVB is absorbed by ozone layer. Depletion of ozone layer allows coming down UVB on the surface of our earth and producing skin cancer.

Aspects of the atmospheric pollution problem is also very important, The anthropogenic impacts on the stratospheric ozone layer, the related trends of the total ozone content drop and the solar ultraviolet radiation enhancement at the Earth's surface level play important role in producing skin cancer. During September 2002, the ozone hole over the Antarctic was much smaller than in the previous six years. It was splitted into two separate holes and it is due to the appearance of sudden stratospheric warming that has never been observed before in the southern hemisphere(Figure 5).The effect of splitting on our environment is now hot topic of research. It is quite expected that Antarctic ozone hole will play significant role to control global ozone concentration. Depletion of ozone layer allows UVB to come down to the surface of our earth and produce skin cancer. The process is shown in Figure 6.

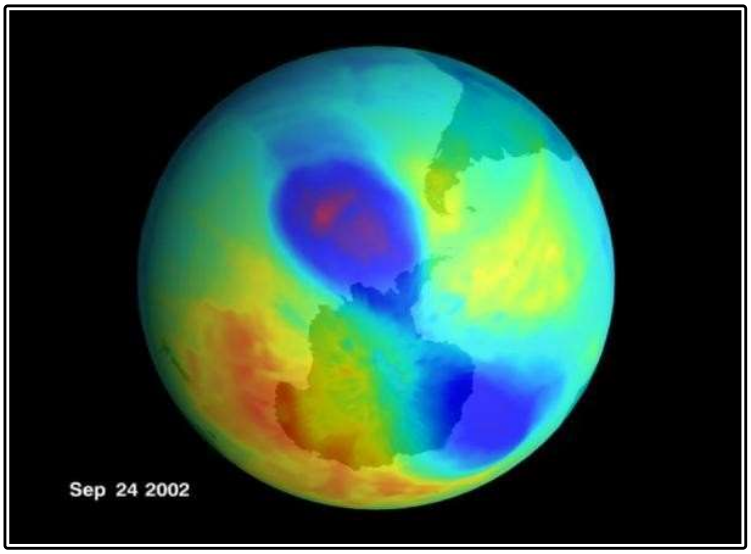

Figure 5 Splitting of ozone hole

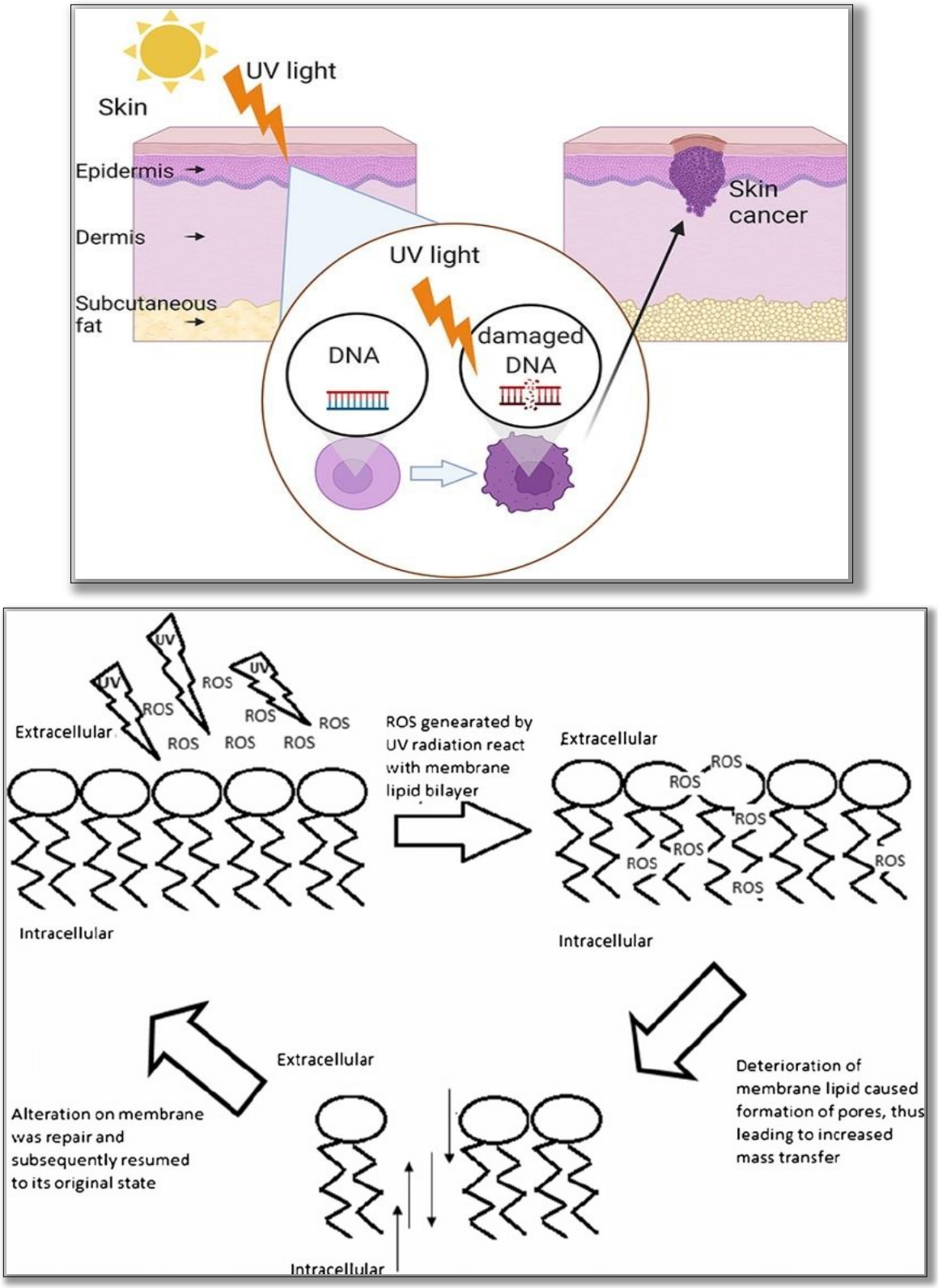

Figure 6 Mechanism of cell proliferating due to radiation

The primary cause of skin cancer is ultraviolet (UV) radiation, which is emitted by the sun . The DNA in skin cells is damaged by UV radiation, which can result in mutations that cause cells to proliferate uncontrollably and develop tumours. Skin cancer may develop if enough DNA damage accumulates over time and triggers cells to begin proliferating out of control. When UV photons interact with DNA molecules, they directly harm them by causing them to break or undergo chemical modification. Mutations, which are modifications to the DNA sequence, may result from this. Although mutations might raise the risk of cancer, they can also be beneficial, neutral, or destructive. The probability of acquiring skin cancer increases as UV radiation exposure increases. The biggest risk group includes those with fair skin, light hair, and blue or green eyes. People who have a family history of skin cancer are also at an increased risk.

3. Conclusion

There are so many ODS(Ozone Depleting Substances) which are already accepted in protocol. Now N_2O is also accepted as important ODS. Midya et.al[7] showed that percentage contribution of N_2O also plays significant role in depletion process of ozone. Special meteorological criteria are responsible for the dramatic decrease of ozone concentration over Antarctica. The temperature of Antarctic stratosphere becomes -80^0C - -85^0C during spring time (October and November). At that time, PSC cloud and polar vortex are formed. This vortex acts as a wall which obstruct heat wave to enter into the polar region. As a result, low temperature of stratosphere over Antarctica will remain for long time. Ozone depletion mechanism will continue for long time at very low temperature in presence of PSC cloud and as a result dramatic decrease of ozone concentration takes place over Antarctica during spring time.

In case of N_2O reaction, these conditions are not essential and its contribution is very high in depletion mechanism of ozone [5].Now a days, in some Himalayan belts, farmers are producing different types of crops. The manure used in cultivation may release N_2O. This may play important role to deplete ozone in the northern part of Himalayan belt. Besides this, the altitude of this region is high. So it is quite expected that solar radiation will be greater than other regions of India. Excessive solar radiation over those regions and N_2O emission may play important role in depletion of ozone concentration over Himalayan belts. Asresult skin cancer cases increase over this region due to increase of solar UVB ray. It may be concluded that due to greater exposure of solar radiation on male candidate with respect to female may be the cause of greater number of skin cancer patient for male. So farmers may be suggested to use alternative manure which will not emit N_2O and to avoid greater solar exposure of solar radiation at those high-altitude levels. It is expected that this will help to protect ozone layer over Himalayan belt and will decrease skin cancer over that region.

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