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RESEARCH ARTICLE

Effect of the Ultraviolet rays in Saudi Arabia (Najran and Hail) Case study Chickenpox diseases.

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Abstract

In this paper ,a seasonal comparative study between the amount of ultraviolet among the most widespread diseases in the Kingdom of Saudi Arabia from the years (2006 - 2011), where found that, the highest percentage for the amount of ultraviolet recorded in the spring, and also the highest percentage recorded between the infectious diseases were for chickenpox which occurs in the spring and for the age group between (5 - 14 years) school students during their studying time.

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1- Introduction

In fact, UV as mentioned earlier in the rank of the electromagnetic spectrum after the end of the X- rays at the edge of the visible light, and is the sun is a natural source of these rays, where is the sun body black perfect very hot to the point of irritation, and radiate radiation with a wide range of wavelengths, of the wide range and intensity relative high UV from the sun is the result of both the high temperature and the large size of the sun itself, therefore, the intensity relative to these rays if they reach the earth's surface, they are likely to be fatal to all living organisms on which they live, have demonstrated the ability of the Creator - the Almighty - in briefing the planet is a protective cover to protect the atmosphere of this planet has been found that the relative intensity of the UV and visible radiation that reaches the earth depends largely on the amount held by the atmosphere of this radiation as a result of absorption or dispersion, has been found under the wavelengths up to 320 nm, the intensity of UV drop substantially as a result of the absorption of ozone gas in the stratosphere, and thus there is no radiation with wavelengths less than 288 nm can reach from outer space to the earth's surface. And then biological effects of solar radiation reaches the earth surface is limited only in wavelengths at the end of the solar spectrum, and include the percentage of solar energy does not exceed 1.5% UV radiation exist in direct sunlight only, but up to the surface of the Earth is also a result of the dispersion of these rays in the layers of the atmosphere. The main factors that affect the UV in the range 290-320 nm, which can reach the Earth surface is largely depend on the inclination angle of the sun relative to Earth surface, in addition the different seasons of the year, is an increasing amount of clouds and vapors and gases in the atmosphere could play a major role in the amount of ultraviolet radiation reaching the Earth's surface. Mattresses spectrum UV (200-400 nm) can be divided to the following areas, which cause each specific biological effects: -UV (a) (UV-A) is (320-400 nm), a long- wavelength radiation known as black.- UV (b) (UV-B) (280-320 nm) with an average wavelength known as solar radiation caustic.- UV (c) (UV-C) (200-280 nm), a wavelength short , where rays shortest (290 nm), they absorb fully in the ozone layer, and these rays can destroy molecules acid Alnyuklak (RNA, DNA) as well as protein molecules, a major in living cells, and no one knows what are the consequences of leaving these rays reach the earth [1]. It is known that, ozone formed in the stratosphere which produced by the interaction photochemical effect of ultraviolet radiation from the sun at wavelengths much lower than (242 nm), and no ozone layer in the stratosphere at concentrations representing the

state of equilibrium dynamic between the amount resulting from that and the amount degrades, as it is known that there are changes daily and quarterly ozone concentration in the atmosphere, and the average rate of production of gas about (400 tons) per second, has been observed that, volatiles and chemically inert and in the layers of the atmosphere can reach the ozone layer above the surface earth through any environmental activities of man. It seems that there was interest in compounds (halogenated) containing fluorine and carbon as the photochemical reactions produce chlorine (or free ions) that interact in turn strongly with ozone, leading to low concentration of ozone gas to low values, in addition to that, it was found (oxides nitrogen) emanating from internal combustion engines can play a role in reducing the concentration of ozone gas, and this will therefore affect UV (UV-B) reaching the earth surface, which in turn will act to cause adverse effects on the species of life on earth. As for the biological effects of UV studies have shown the measurements that have been made UV in solar radiation is the primary cause of the inflammation of skin that occurs as a result of exposure to sunlight as in Figure (10), and the intensity marrow UV daily between the hours of 10:00 and 2 in the afternoon about (80%) of this dose between 9 am and 3 pm. Form (10) shows skin infections resulting from exposure to the sun. It has been found that the shorter wavelength could be measured in the solar radiation in the afternoon near the equator about (290 nm).

2- U V and Health

After the presentation of the above risk of exposure to harmful UV rays with a short wavelength and high energy which protect us from the ozone layer after post medical scientists and physicists, this area has surprised the World Health Organization the following report:-

- 1- That exposure to ultraviolet (harmful) works to break down acid molecules as Alnyuklak (RNA, DNA) as well as the protein, the main molecules in living cells, making it the major cause of vulnerability of organisms resistant to diseases.
- 2- If ULTRAVIOLET severe enough which cause burns to the first or second degree can also lead to the destruction of the surface layer of the skin.
- 3- Revealed research studies that there is a close relationship between the decline in the concentration of ozone and skin cancer as the decreasing concentration of this gas in the layer (the stratosphere) helps access a large amount of ultraviolet (harmful) to the Earth's surface, causing many types of skin cancers, including the so-called black tumor (melanoma), which leads to death in most cases.
- 4- If the entire ozone layer fell by 10% led to an increase in the incidence of skin cancer in the world by 26%
- 5- In terms of ophthalmologists reported that the acute effects of this radiation on the eye leading to inflammation in the iris and cornea conjunctiva and cancer Cataract which leads to blindness.
- 6- Hand feeding has reported the global food to offer the terrestrial environment for overdoses of ultraviolet (harmful) could lead to a lack of yields of major food crops, also permeates these rays for a long distance in the deep ocean will lead to the killing of "phytoplankton".
- 7- Have confirmed report issued by the United States Agency for Environmental Protection (EPA) that human exposure to ultraviolet radiation (harmful) working on a weakened immune system in the human body and thus helps to ease disease viral sore hepatitis and skin infections caused by parasites also makes the body less ability to fight tumors and spread in the body without resistance.[2]

To access the chromatic scale simplified human can understand simple reference to the staging follows chromatography:-



- 1- Green (1 and 2) means an ultraviolet wavelength long and there is no risk from exposure to them and there is an advised to wear top hats and sunglasses.
- 2- Yellow (3, 4 and 5) mean an ultraviolet wavelength average, a medium risk and advised to wear top hats and sunglasses and take refuge in the shade from the direct rays.
- 3- Bright red color (6 and 7) mean an ultraviolet wavelength short and there is a risk of exposure to them at high and advised to wear hats head and sunglasses and hunker down in the shade of rays direct and prefer to avoid out of ten o'clock am to fourth in the afternoon.

- 4- Red dark (8,9,10) mean an ultraviolet wavelength short higher grade and there is a risk of exposure to them by very high and advised to wear clothes which protect all parts of the body from exposure to sunlight, as well as hats head sunglasses and hunker down in the shade of rays direct and prefer to avoid going out between ten o'clock in the morning four after noon and the abolition of the daily routines such as exercise and others.
- 5- Blue (11) means an ultraviolet wavelength is very short and not supposed to reach the ground and there is risk of very severe exposure to these rays and advised not to go out from ten in the morning and four pm and if necessary we take all safety procedures and wear Clothing to protect all parts of the body and wear hats and sunglasses , take refuge in the shade from the direct rays and avoiding daily routines.[3]

Ozone depletion in the stratosphere caused by several chemicals, has risen the monitoring of UV radiant fluxes to a new level of importance in environmental research. Nevertheless, the UV radiant flux levels greatly depend on several atmospheric and surface parameters: the air mass traversed by the direct solar beam, which depends on the solar zenith angle, the altitude of observational site, atmospheric scattering processes (e.g. aerosols and trace gases), meteorological conditions, e.g. cloudiness [4-9]. And ground albedo as well [10, 11]. Because of the combined effect of these parameters on the UV radiant flux levels, it is difficult to determine the role of each variable separately. It is therefore essential to have as many measurements as possible under different environmental conditions. Most published experimental results, concerning the greater Mediterranean basin use measured values of global UV (Guv) and broadband global (Gh) radiant fluxes to determine the correlation between the two [12 – 20].

3- Chickenpox

Chickenpox is a common and very contagious viral infection that over 90% of people get during childhood unless they have been immunized. After an infection, some of the virus may stay in the body (in nerve cells) and at some later time the virus can become active again causing shingles. A vaccine is now available to protect children and adults against chickenpox. It is caused by a virus called Varicella Zoster Virus. Most children who get chickenpox have a mild illness, but some can become quite ill. Usually adults who get chickenpox have more severe illness. The illness with chickenpox usually lasts about seven to ten days. The illness may start with a fever and feeling unwell, like having a cold. In some children the first sign of the infection is rashes. Rash usually starts on the chest, and most spots appear on the chest and head (including in the hair), although some children and adults can have spots all over the body. Spots start as red, itchy lumps, which then become blisters. The top comes off of the blister and watery fluid escapes. Then a crust forms on the spot this crust takes about five days to fall off. It often come in waves for several days so there will be new lumps, blisters and crusting sores on the skin at the same time.

The infection is spread when the person sneezes or coughs, or when someone touches the fluid in the blisters. It can also be spread by touching something that has touched the fluid from the blisters (e.g. a dressing which covered the sore). Chickenpox can be caught from the fluid in the blisters of someone with shingles, though this is rare. The person with chickenpox is contagious from the beginning of the illness (up to two days before the spots appear) until about five days after the first spots appear. So long as there are no new blisters or moist crusts on spots, the person will not be contagious even if there are still crusts on the skin. Chickenpox is very contagious (easy to catch). Over 90% of close contacts (such as other family members) will get chickenpox if they have not already had it or not been immunized. It usually takes around 14 to 15 days to develop after contact with someone who has it (range 10 to 21 days).

A child should be kept at home for five days after the first spot appear, or until all blisters are dry if this takes longer. Some scabs will still be there but as long as they are dry the child does not need to be kept out of school, or away from others. For most children chickenpox is a mild illness; however some can have spots over the whole body, including the mouth and the genital area. They may have encephalitis (infection of the brain). They may be quite unwell from this, but will usually recover fully. The spots are very itchy, and scratching can cause a bacterial infection (the same as impetigo, or school sores). An infected spot is more likely to leave a scar.

Chickenpox can be a fatal illness for people who have immune problems (e.g. with HIV/AIDS, treatment for severe asthma or cancer). All these people need to be seen by a doctor urgently if they are in contact with chickenpox. There is a treatment which will protect them from the severe effects of the infection if they get the treatment soon after coming in contact with it. If a pregnant woman gets chickenpox during the first half of her pregnancy, there is a small risk that the unborn baby may be affected (less than two percent). Some of the effects include carrying, and birth defects. If a woman gets chickenpox from five days before delivery to two days after delivery, it is estimated that there is up to 30% risk that the baby will develop a severe infection. Many of these babies will die from the infection. Pregnant women should see their doctor if they have been in contact with chickenpox and are not certain that they have had chickenpox. If a pregnant woman has been exposed to chickenpox, and she has not already had the infection, she can, if needed, be given Zoster Immunoglobulin to give her temporary protection against the illness. This can be used for some other high risk people[3].

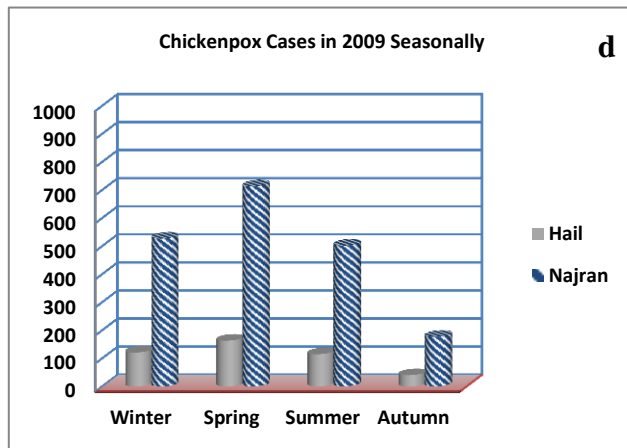
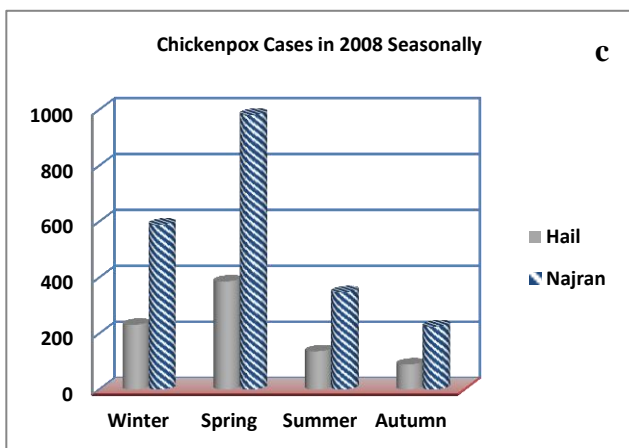
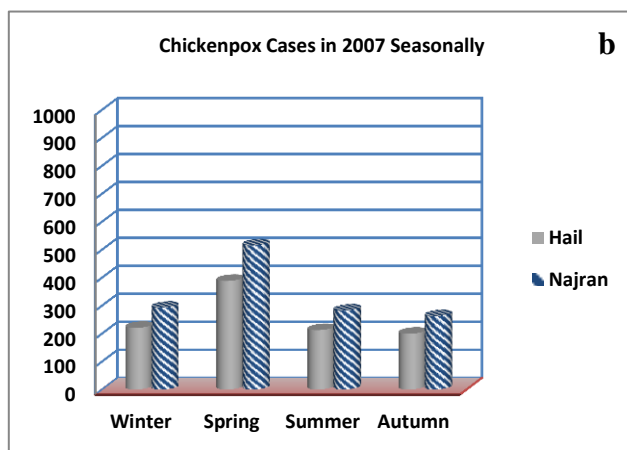
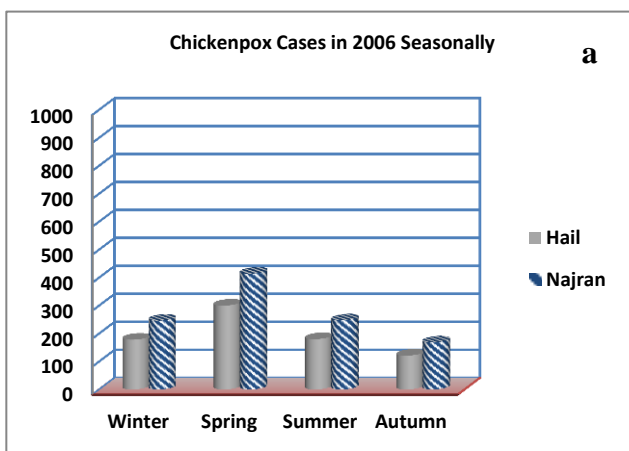
4- **Database**

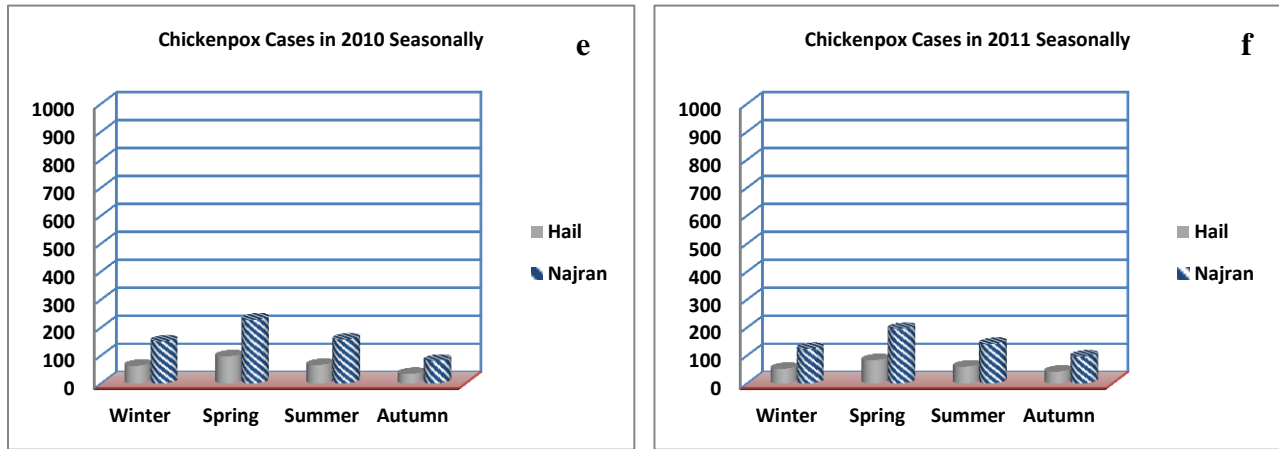
In this research, we have taken the study period from (2006-2011) on Hail and Najran North and South Saudi Arabia. The Ultraviolet(UV) data taken from and health data source from Annual Statistical Book issued by the Ministry of Health and Population of Saudi Arabia.

5- **Results and Discussion**

Firstly, the number of chickenpox cases in north Saudi on Hail is less than the cases which recorded in south Saudi on Najran as in table(1), while the number of Population in Hail region recorded higher than Najran as table (2). From table (1), we notice that, the values of chickenpox in Najran are larger than in Hail of all the years of the presents study. The difference between the maximum and minimum values of the chickenpox in presents study varies from 52% to 57%, while in table (2), show that, the number of population in Hail are larger than Najran. In spite of the chickenpox in Hail is less than Najran at the same period time, this due to the value of UV in Hail is less than Najran, or the amount of UV which received in earth surface in Najran is larger than Hail.

| Table (1), shows, the values of chickenpox for Najran and Hail during the period time from (2006-2011) | | | Table (2), shows, the number of population in the selected site the present study time. | | |
|--|--------|------|---|--------|--------|
| Years | Najran | Hail | Years | Najran | Hail |
| 2006 | 1075 | 779 | 2006 | 442914 | 548714 |
| 2007 | 1351 | 1019 | 2007 | 459931 | 558085 |
| 2008 | 2143 | 842 | 2008 | 474108 | 569230 |
| 2009 | 1919 | 439 | 2009 | 488304 | 580437 |
| 2010 | 616 | 260 | 2010 | 505652 | 597144 |
| 2011 | 555 | 237 | 2011 | 527332 | 622495 |





Figures, 1 (a-f) show, that, the seasonal variation of Chickenpox in during time (2006-2011) over Najran and Hail.

From these figs, generally, the highest values of chickenpox occur in Spring season in the selected sites in the present study, while the minimum value occur in Autumn season, and in summer and Winter season, the value of chickenpox are varies between the maximum and minimum value.

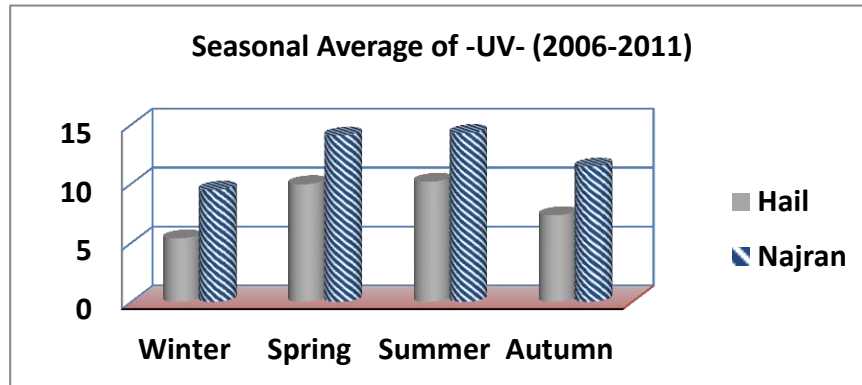
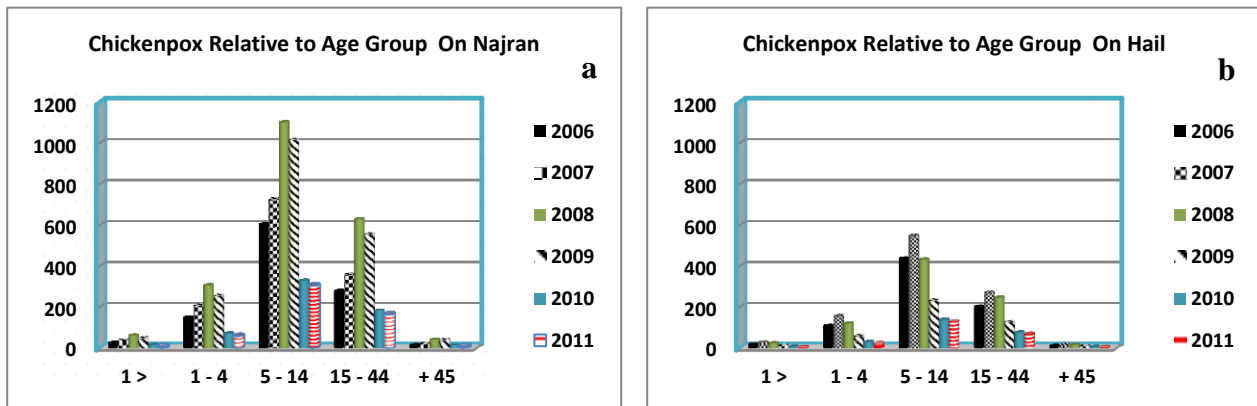


Fig (2), show, the Seasonal Average of U V in selected region during the time (2006 – 2011)

From this fig, we can say that, the value of UV in spring and summer season are higher than in winter and autumn season. The difference between max and min values varies from (47.22% on Hail to 33, while 59% on Najran). Also from fig (2), In spite of the amount of UV in Summer season is a relatively small increase about in Spring season however, the chickenpox cases in Spring season are larger than in Summer season, this is what we send out these arch towards our age group that get sick.



Figures, 3 (a-b) show, that, the Chickenpox relative to age group over Najran and Hail in during time (2006-2011).

Fig, 3 (a-b), show that, the age group from 5 to 14 year are get the highest rate of the disease, and this age group are school students, so that consider, the main cause of non-registration of chickenpox in higher ratio in Summer season is the summer vacation and not mixing with students.

6- Conclusion

We conclude from this research that chickenpox is increasing in areas where increasing amounts of ultraviolet especially in the age group ranging from 5 to 14 years (school students) in addition to the necessity of taking into account the WHO guidelines to avoid the risk of exposure to ultraviolet and avoid mixing in the case of infection.

7- Recommendations

We recommend this search through should be increased raising public awareness of the dangers of exposure to harmful ultraviolet rays to the danger on humans, and work on the spread of the staging the color public places to illustrate the dangers of exposure to ultraviolet rays also recommend an increase of students vacation school to include part of the Spring season.

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