Research on Time Selection of Mass Sports in Tibetan Areas Plateau of Gansu Province Based on Environmental Science

Jike Gao
The Institute of national sports culture, Gansu Nationalities Normal University, Hezuo gansu 747000)

Abstract. Through using the method of literature review, instrument measuring, questionnaire and mathematical statistics, this paper analyzed the current situation in Mass Sports of Tibetan Areas Plateau in Gansu Province. Through experimental test access to Tibetan areas in gansu province of air pollutants and meteorological index data as the foundation, control related national standard and exercise science, statistical analysis of data, the Tibetan plateau, gansu province people participate in physical exercise is dedicated to providing you with scientific methods and appropriate time.

1. Research Objects and Methods

1.1. Research Subjects
The time selection of mass physical exercise in Gansu Tibetan Plateau

1.2. Research Methods

1.2.1. Instrumental Measurement. The LGH-01 type long optical path DOAS instrument was used to monitor the air indexes of Tibetan Plateau in Gansu. The indexes included pollutants two parts: SO2, NO2, PM10, and meteorology: wind speed, humidity, temperature, air pressure.

1.2.2. Questionnaire Survey Method. This study by the research group compiled "the Tibetan people participate in sports activities present situation investigation" as the basis of the Gansu Tibetan Plateau, for the masses to participate in the physical exercise status questionnaire, survey for the masses of the male and female Tibetan Plateau (not including students and soldiers).

1.2.3. Mathematical Statistics. The data of air quality measured by LGH-01 long path DOAS instrument and the result of questionnaire survey were processed by SPSS16.0.

2. The Climatic Environment Status of Tibetan Plateau in Gansu
The main climatic characteristics of Gannan Tibetan Autonomous Prefecture are plateau continental monsoon climate, large temperature difference between day and night, and average temperature at 1~13 centigrade. The hottest year is July, the average temperature is 17.9, the coldest is December, and the average temperature is -6.8 centigrade. Gansu Tibetan Plateau vegetation is scarce, endothermic fast, heat dissipation is also fast, resulting in high temperature at noon, low temperature
in the morning and evening. The average annual precipitation is 400–800mm, and the average sunshine hours are 1800–2600 hours. The annual sunshine duration is long, the ultraviolet radiation ability is strong, the ultraviolet radiation quantity is smallest in winter, the summer is biggest, especially 6–9-month grade is highest, is 7–10 class, the intensity is strongest, in the spring and autumn two season is situated in the middle. The diurnal variation of ultraviolet radiation is regular, and it is small at noon, small in the morning and afternoon, and symmetrical in the afternoon. The air is thin, water vapor content is low, the climate is cold, dry, low pressure, hypoxia, etc.

3. The Analysis on the Current Situation of Mass Physical Exercise in Gansu Tibetan Plateau

3.1. The Variable Characteristics of Mass Physical Exercise in Gansu Tibetan Plateau

From the time point of view, the Tibetan Plateau in Gansu mass sports time mainly in the morning, accounting for 75.3% of the total number, and each exercise duration of more than 30min. Table 2 data show that the main places of Tibetan physical exercise in Gansu are mainly square and roadside, accounting for 63% and 23% respectively. The survey found that Gansu Tibetan sports a total area of 354578 square meters, of which the indoor area of 16898 square meters, an area of 337680 square meters. And indoor venues are basically distributed in urban areas, rural areas rarely have indoor venues. Gansu Tibetan sports venues per capita area of 0.512 square meters, among them, rural area of 0.44 square meters per capita sports venues, sports venues per capita urban area of 0.53 square meters, while China's current per capita stadium area of 1.2 square meters, so there will be public sports venues and community sports facilities shortage of distress situation.

3.2. The Cognition of the Local People on the Environment of Physical Exercise

Mainly from the two aspects of pollutants and meteorological index of physical exercise in the crowd were investigated, the results show that the Gansu Tibetan people think that PM10, SO2, NO2 influence on physical exercise degree were 62%, 41%, 20%, especially since November 2013, 25 provinces of our country suffered haze weather in most parts of the country have emerged a wide range of serious pollution. Haze once affected the normal operation of the traffic, and even some primary and secondary schools had to suspend classes. Haze has invaded our lives, seriously affecting our physical and mental health. The trained respondents had higher awareness of PM10 than other pollutants. According to the investigators, the effects of temperature, humidity, air pressure and wind speed on physical exercise were 75%, 12%, 10% and 27%, respectively. It can be seen that the physical training people do not know enough about the weather index.

3.3. Local Air Pollutant Index

To obtain data of three years of 2014~2016 SO2, NO2 PM10, the mean maximum value were 0.015mg/m3, 0.017mg/m3, 0.067mg/m3 from the monitoring station, the mean are within two standard, the concentration of air pollutants with average ambient air quality requirements of china.From the raw data every day, there are hidden dangers. In 2016, for example, the monthly statistics more than two national standards 5 times to the data, which SO2 has 7 times more than two standard in March, the maximum value is 0.071 mg/m3, 9 times in May more than two standard, the maximum value is 0.113mg/m3, 8 times in June more than two standard, the maximum value is 0.128 mg/m3. NO2 only exceeded two grade standards in 8 times in June, with a maximum value of 0.188 mg/m3. PM10 in January 7 more than two standards, the maximum value is 0.251 mg/m3, 7 times in February more than two standard, the maximum value is 0.241 mg/m3, 5 times in April more than two standard, the maximum value is 0.172 mg/m3, 3 times in November more than two standard, the maximum value is 0.17 mg/m3. Data show that local air pollutants are potentially harmful to humans.
Table 1. 2016 monthly mean values of SO2, NO2 and PM10 (unit: mg/m3).

|                       | January | February | March   | April   | May     | June    | July    | August  | September | October  | November |
|-----------------------|---------|----------|---------|---------|---------|---------|---------|---------|-----------|----------|----------|
| SO2                   | 0.006   | 0.005    | 0.013   | 0.021   | 0.016   | 0.055   | 0.013   | 0.006   | 0.007     | 0.004    | 0.008    | 0.006    |
| NO2                   | 0.005   | 0.007    | 0.014   | 0.015   | 0.021   | 0.076   | 0.015   | 0.016   | 0.012     | 0.011    | 0.008    | 0.006    |
| PM10                  | 0.087   | 0.091    | 0.063   | 0.081   | 0.057   | 0.067   | 0.056   | 0.048   | 0.041     | 0.061    | 0.073    | 0.068    |

4. Analysis of Physical Exercise based on Environmental Quality

4.1. According to the air quality index, choose the time of physical exercise scientifically

The results of environmental monitoring in a city also proved that the most serious pollution time in the day is in the morning. Specifically, the morning 6~9, during which time the amount of harmful gas in the air is the most. [1] and the Tibetan Plateau has low temperature in the early morning, especially in winter and spring, and it is prone to frostbite in Gansu. Therefore, the morning is not the best time to exercise. Study of Greg Atkinson et al showed that individual physical highs and lows controlled by "body clock", such as heart rate, blood pressure, vision, touch and smell sensitivity, hormonal regulation and enzyme activity and maximal oxygen uptake in the afternoon when 16~19 reached a maximum value, and the ideal. This stage is the strongest period of human motion performance. [2]

4.2. The relationship between SO2, NO2, PM10 and automobile exhaust and physical exercise

Gansu Tibetan Plateau industrial development is backward, SO2 source, have obvious seasonal variation, with higher concentration of SO2 pollution during the winter heating period, a long time, the diurnal variation of Shuangfeng, caused by around 8 and around 22 p.m., the maximum value is 0.126 mg/m3, more than two national standards. Therefore, it is necessary to avoid the serious pollution period during physical exercise.

The experimental results show that the NO2 concentration in the air of 0.20~0.41mg/m3 can smell knowledge; the concentration of 3.0~3.8mg/m3NO2/min will make contact with increased airway resistance; when the concentration of 7.5~9.4mg/m3 will contact NO2/min caused by increased airway resistance and lung function decline. The pollution concentration of NO2 concentrated in the two peak hours, the highest concentration was 0.189 mg/m3 in the morning, and the value was slightly lower in the afternoon due to the sun.

When PM10 increased 10ug/m3, 0~14 and 15~64 age groups of asthma emergency daily volume increased 1.2% and 1.1%, above 65 years old with chronic obstructive pneumonia (COPD) were increased and the respiratory system disease emergency number 1% and 0.9%. [4] spring affected by dust weather, atmospheric PM10 concentration significantly increased, and more sand Tibetan Plateau Area in Gansu, and the strong wind, the wind began to blow generally about 13:30 to about 17, stop, at this time the maximum PM10 value reached 0.252 mg/m3, more than two national standards. Therefore, try to avoid this time during exercise.

4.3. Relationship between meteorological change law and physical exercise in Plateau

The air cooling index WCI can accurately calculate the level of environmental cold intensity, that is, the heat dissipation rate of the exposed body surface under certain air temperature and wind speed. WCI=4.184 (10 -10.45V) (33-Ta), unit KJ/ (M2 • h); V representing wind speed, unit m/s; Ta indicating temperature, unit temperature. Table 2 is the Gansu Tibetan Plateau [5] 2014~2016 three years of monthly mean, the calculation results according to the WCI table that the area of the WCI are in the "cold", therefore, warm is attention of physical exercise is essential, especially as far as possible not to exercise in the morning.
### Table 2. monthly mean temperature, humidity, air pressure and wind speed (unit: centigrade, %, Pa, m/s) in the Tibetan Plateau of Tibetan Autonomous Region

|          | January | February | March | April | May | June | July | August | September | October | November | December |
|----------|---------|----------|-------|-------|-----|------|------|--------|-----------|---------|----------|----------|
| temperature | -0.6    | -2.5     | 3.1   | 10.9  | 11.7| 13.1 | 17.9 | 15.3   | 12.8      | 5.9     | -1.1     | -6.8     |
| humidity  | 35.1    | 47.0     | 50.2  | 50.4  | 50.0| 74.4 | 67.4 | 72.7   | 67.3      | 56.6    | 62.9     |          |
| air pressure | 681.3   | 694.7    | 680.6 | 792.5 | 1006.8| 1013.0| 492.8 | 707.0   | 708.3     | 712.2   | 711.1    | 707.0    |
| wind speed | 0.7     | 1.1      | 1.3   | 4.3   | 9.9 | 10.0 | 1.0  | 1.0    | 0.9        | 1.0     | 0.9      | 0.7      |

Human comfort index (kssd) is to describe the temperature, humidity and wind speed index effects on the human body, it characterized the body feels comfortable degree of air environment in certain conditions of temperature and humidity, wind, cold, summer without the aid of fire equipment and facilities, to ensure a suitable climate conditions for normal cutting behavior. Comfort index of uniform standards China Meteorological Bureau will be divided into 9 levels of the human body, most of China's meteorological stations usually use the improved body comfort index (kssd), which was calculated as follows: Kssd =1.8 t -0.55 (1.8 T-26) × (1-r/100) -3.2 V 1/2+32 [6], through the calculation of the Tibetan areas in Gansu. Most of the time is 1 kssd (cold). The average duration of kssd is 5 (comfortable), only 38.3 days, and kssd is 6 (warm) time, the average annual 20~40d. Study on human comfort Steadman show that human life and work in the best effective temperature of 17~24.9 DEG C, the most beneficial to human health relative humidity between 60%~70%; while the wind speed is most suitable to the human body is 2 m/s. [7] Gansu Tibetan Plateau perennial low temperature, low humidity and human comfort index is low, most of the time do not feel comfortable, while physical exercise should pay attention to keep warm, Rocky Mountain suitable choice in winter sun, sunrise and sunset late, early, appropriate adjustments may be made.

5. **Physical training strategy based on Tibetan Plateau Environment in Gansu**

It is suggested that the Tibetan plateau people in Gansu should choose indoor physical exercise in winter and spring. In outdoor sports, should be rational use of environmental science knowledge, according to the Gansu Tibetan plateau cold and hypoxia; air pollution exists in low temperature, morning exercise; climate change has obvious plateau characteristics, air humidity, wind characteristics, human comfort index is low etc. Should choose the time at 5 pm to 7 pm is appropriate, and on the basis of the Gansu Tibetan plateau characteristics, selection methods and means of physical exercise right, as well as the appropriate exercise intensity, according to different people, formulate appropriate exercise prescription for the Gansu Tibetan Plateau, the masses of scientific and healthy physical exercise escort.

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Author's brief introduction: Gao Jike (1983-), male (Han nationality), Gansu Jingning people. Lecturer, mainly engaged in national traditional sports research.

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