

## PROCESSES OF ACCLIMATIZATION, AT EXAMPLE OF ATHLETE PREPARATION TO OLYMPICS IN MEXICO 1968

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- Theory of Sport,
- History of the Olympics Games
- Mexico'68
- Altitude training

### Abstract:

Main propose of this article is analysis od athletics methods in high-altitude training, used before 1968, within pre-Olympics preparation processes. **Material and methods** were analysis of the athletic trainings descriptions of participants into Olympics Games, released in specialist athletics journals. **Results:** registration of methods and training forms, used before the Olympics Games in Mexico'68. **Methods,** training forms and intensity were the same, as in trainings before. **Conclusions:** preparation before Olympics Games in Mexico'68, demands on coaches, changing places of preparation camps into places with similar altitude, as in Mexico.

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## INTRODUCTION

The article was based on analysis of reports made by coaches, doctors and sport activists, advertise in sport magazines presented in within 1965-1969.

The Olympic Games organized in Mexico in 1968, were controversy for athletes and coaches of national representations which took part in competition there. Reason of theirs concerns was location of sports facilities (including sports area), where they had to compete for medals of XIX Olympics in Mexico City which was at 2200 m a.s.l. At this altitude, air which athletes breathe had lower level of oxygen saturation, than most of athletes used to train and live, what was particularly an advantage for sportsmen from incl. Ethiopia, Kenya, Mexico and other countries.

Toward better understanding of air with lower oxygen level and effects of it and lower pressure (... *in Mexico City about 24% lower, then at sea level, what is equal to declination of 0.68 l of blood...*) [Cervantes, Karpowich 1965: 9], in experimental reconnaissance which was organized by coaches and medicine doctors of the following countries: Australia, France, RFG, Japan, USA and USSR. This journey propound necessity of preparation objects for alpine training, using natural mountain terrains; USSR in Almaty (nowadays territory of Kazakhstan), France in Pyrenees, Italy and Germany in Alps, Poland in Tatry Mountains, considered by dr Ernst Joki, in "WORLD SPORTS", as special and beneficial for climatic training. In connection with that, most of national representations organized Olympic preparations in sports camps located at similar level to Mexico City. In pre-Olympic alpine arrangements, on application of national coaches and doctors who exercise sport-medicine care, took part countries as follows: Australia, RFG, USA, USSR [Sozański 1965:3-4].

Most of athletes had concern about their start at height of 2200 m a.s.l. what was written in most of sport newspapers, example can be utterance of:

Chris Brasher- winner of 3000 m steeplechase run in Melbourne: ... *Extremely high location will put on head results and orders at the post. It will be big surprises... Long acclimatization it will not do, no one can accustom to staying under the water, the same is like none of runners could use to endurance effort on such high altitude...* [Sozański 1965; Krzesiński 1965:5; Cervantes, Karpowich 1965].

Other athlete who had concerns with altitude where Olympics were organized was multiple World record-holder on long distance, Ron Clark, who evaluated starts in Mexico in a following way: ... *Probably acclimatization may concur to relative keeping form in one run. But all of runners, outside of marathoners and maybe 10.000 m, will have elimination heat, half-finals and finals. Who can stand effort like this and sustain full efficiency? Long-distance and middle-distance runners can burke in absence of oxygen. I feel sorry for my colleagues, who are going to run in 1968 ...* [Sozański 1965].

Hungarian coach, who was working in USA, written about problems with sport physical effort during Olympics in Mexico, pointed also aspects of daily life and poorly developed public transport, what will get athletes living in Olympic village to walk,

... *if besides to that we'll add normal in that type of events, stomach problems and nervous conditions, we can be sure that this Olympiad will go down in history... of medicine...* [Sozański 1965].

Coaches and athletes who took part in pre-Olympic preparations, believed that... *extended training in lower oxygen conditions, all the better adaptation for the Olympic Games in Mexico...* [Sozański 1965]. What in nowadays knowledge shows that way of preparation was excellent to prepare body into competition at high altitude, especially for sprint runners, who use altitude trainings before important competitions [Issurin, Shkliar, Kaufman 2001].

Issues of altitude adaptation solved by using pressure cell by coaches of German athletes, which substituted conditions of alpine accommodation. In the same time sport representation of USA took part in experimental altitude trainings, leaded by prof. Bruno Blake, at height of 2300 m a.s.l. in Red River in New Mexico state. Location of this experiment was similar to climatical conditions in place of Olympic organisation.

Scientists set following research problems, with conclusions and results, published in monthly magazine *TRACK TECHNIQUE*. The most important for them was to find the answer for the following question:

- *how will hold body work during effort, when requirement for oxygen occur at height similar to Mexico City?*
- *how attitude influence on brief effort?*
- *what is influence of 10 days acclimatization with one-sided training at 2300 m a.s.l. height, aborted with stays in higher zone,*
- *in what way athlete body retain, after comeback to lowland from high altitude training camps?* [Sozański 1965].

During this survey, runners took part in 440 and 880 yards (around 402 m and 804 m), and 1 mile (1609 m) run. They were placed at height of 3000m a.s.l., in 1<sup>st</sup> and 10<sup>th</sup> day after comeback to lowland terrains, they were complete with laboratory investigation and medical examination [Sozański 1965].

Conclusions after study of prof. Bruno Blake research group were as follows:

- *Workout at big heights contribute to significant improvement in athlete performance, after coming back to lowlands. Explicitly increases blood supply and capacity of lungs.*

- *All endurance results, involving massive oxygen resources- so at distance over 800 m (over 90 seconds) in mountains are much more difficult than the same effort in lowlands area. During 1 mile run (1609 m) after 24 hours stay in mountains, results were worse about 26 seconds, while after 10 days- 13 seconds, than results in lowlands.*
- *Ability to all short efforts (sprint type, to 400 m) stays without any changes regardless of attitude, after some time of acclimatization, and come back to lowlands succeed even increasing of results.*
- *After coming back to lowland, during first week, results in sprint shows some improvement trend, whereas results in endurance sports improve significantly. [Sozański 1965]. Opinion about this physiological changes during high altitude training in 2004 is presenting R. Wilber: ...athletes who use a hypoxic apartment typically 'live and sleep high' in the hypoxic apartment for 8 to 18 hours a day (...) may lead to improvements in postaltitude endurance performance [Wilber 2001: 249–265].*

In the end of article, authors set the following hypothesis: ... *there is no concern about results in sprint and runs up to 800 m and in technique competition...; 10 days of acclimatisation process isn't enough to acclimatise to attitude of 2300 a. sl. and for performing physical effort; It is possible (...) to improve results in endurance competition which will be at 2300 a. sl., when some part of preparation will be organize at higher then that level (3000-4000 m); In first week after comeback from mountains, we can expect major improvement of results in all competitions* [Sozański 1965].

All conclusions of American scientists were opposite due to Olympics organizer guarantees, who in special campaign prepared, before assigning organization of the Olympic Games to Mexico, in the press of Mexican Science Academy, at the same time informing them that only little problems may occur connected with high altitude.

According to authors of mentioned research, for athletes, who are training (and living) in Europe, time for acclimatization process is 24–48 hours in Mexico [Sozański 1965].

Another country who was interested in using high altitude processes in their trainings was the Union of Soviet Socialist Republics (USSR). Soviet scientists, who were making physiological research on athletes performing trainings in mountains, noticed that physical effort and results achieved, are worse initially and progressively get better with acclimatization.

According to theirs research of adaptation to high altitude, organized in 38 days researching camps. First was in Yerevan situated at height of 900 m a. sl., second in village Tsaghkadzor (2000 = 2200 m a. sl.), in this research 9 students from Armenia Physical Culture Institute took part at age between 17 – 22 years, including five 3<sup>rd</sup> class athletes. Physical tests which were prepared for them, to check their condition and influence of high altitude training, included:

- 800 m run,
- 3000 m cross-country run,
- 30 m with running start,
- triple jump,
- vertical jump,
- shot put,
- repeated 100 m run to refuse [Kazarian 1965: 14–15].

All acclimatization processes which took place in athlete body were measured by

above-named tests and also with: blood pressure, spirometry, heart rate, general sensation survey (made every morning on an empty stomach and after morning workout).

Survey results were as follows: ... *44% of interviewee, in first 3 to 6 days of staying at height 2000 – 2200 m a. sl. noticed that their mood is exacerbate (headache, breath problems...), especially among students who live every day in Armenia in lowest located cities* [Kazarian 1965; Fuchs, Reiss 1990].

Scientists during cardiovascular system exam noticed that:

- Heart rate frequency increases on average 15,6 beats per minute,
- Systolic pressure increases about 12,3 mm Hg,
- Diastolic pressure declines about 14,7 mm Hg,
- Breathing frequency declines about 5,1 L/min,
- Breathing capacity declines about 178 cm,
- Heightened heart rates from 2 to 20 beats per minute, noticed at 88% participants.

After 4 – 6 days, according to the contemporary knowledge researchers noticed that staying at 1000 – 1300 m a.sl., cardiovascular rate gradually improved:

(Jakowlew, Kriestownikow, Tawastszerna, Prokop, Ostrandom), acclimatization to attitude over 1700 m a.sl. come after 8 – 12 days, what shows that guarantees of organisers of Olympics in Mexico were wrong, according to scientific research [Kazarian 1965].

Soviet coach and sport-medicine doctors, at first and last phase of camp organized, repeated, changeable, interval control run. Second stage was characterised by dosing everyday significant effort in shape of skiing (at distance between 8 – 10 km), that provides reducing of running trainings, with focused targets on increasing speed-endurance.

Repeated run was realised by:

- Up and downhill run,
- Running in ski boots in heavy snow,
- Repeated run 10 x 200 m,
- 150 m sprint,
- 150 m jog,
- different jumps,
- playing football in snow,
- everyday morning special warm up – 20 min [Kazarian 1965].

Skiing was treated as addition for whole body workout, as researchers noticed: ... *this combination connected with specialist running training appeal to improve athletes results and general wellbeing* [Kazarian 1965]

The exam prepared at the end of camp had form of 10 km cross-country skiing, results which they achieved were between 42 – 61 minutes.

After this camp, athletes who participated there, set their personal best record at normal attitude competition (Yerevan 900 m a.sl.).

Results of experimental-camp organized in Tsaghkadzor, showed that physical preparation of all systems in athlete body increases significant, after this experiment, researchers instructed that:

- *progressive increasing physical effort after active altitude acclimatization,*
- *increasing volume of short-timed intensive workout,*
- *concurrently reducing volume of general training load/burden,*
- *regiving of priority to repetition training method for middle distance runners* [Kazarian 1965].

## CONCLUSION

Organization of the Olympics Games in 1968 in Mexico was cause of many discussions, and also involved coaches and athletes, especially specializing in endurance competition to search new training methods, preparing them for competition in environment with altitude similar to Mexico, with 20 % lower oxygen saturation [Ambroży, Wieczorek, Mucha 2016].

Having regard to altitude conditions by national teams which were in Mexico, show that there were not many “unprepared” athletes. It was noticed that results in strength competitions performed by athletes were worse, whereas thin air aid to speed disciplines, where many records were beaten. Surely alpine conditions were advantage for athletes comes from high-altitude countries, therein long distance runners from Kenya and Ethiopia.

Significant influence on reached record-breaking results had elastic artificial stadium surface.

Polish athletics solved problem of acclimatization, by organizing specific training processes 6 weeks before Olympics.



Bob Beamon in his record long jump in Olympics, Mexico City 1968

[<https://thecuriousastronomer.wordpress.com/2012/07/17/bob-beamon-leaps-into-history/>].

Among 34 World records and 38 Olympics records which were set during Mexico Olympics, especially result of Bob Beamon (USA), who in long jump set new World record, longer from previous one by 55 cm [C. Gifford: 2004: 40]; [Drażdzewski, Szkiela 1975:114-115; Osterloff 1971:261; Minkiewicz 1991:109; Mulak 2006:359].

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