

# Outcomes of Intensive Insulin Therapy Regimen at the Georgian Diabetic Camp

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## **Abstract**

The 10-day sessions of the diabetic camp were held in mountain Bakuriani, in years 1996-2000 in Georgia. Intensive blood glucose (BG) level monitoring has showed, that twice a day injection of regular and NPH insulin combination, with humalog extra shots as needed, allows to avoid ketoacidosis and severe hypoglycemia during the camp session. In average 34% of the campers, the improvement of the diabetes management could be achieved. Insulin daily dose adjustments are different and stay unchanged in only 4-7% of campers. This reflects a very intensive work to BG in acceptable range.

**Keywords:** *diabetic camp, insulin intensive therapy, monitoring*

## **Introduction**

The modern meaning of management of Diabetes Type 1 means a balance of insulin, diet and exercise. To achieve such a balance is especially important in younger age groups, like children and adolescent. It is an only way to obtain a normal growth and development for this population and reduce the risk of later diabetic complications.

Summer diabetic camps for children with diabetes type 1 are suggested to have proven short - term benefits for campers. Most of them belong to non-medical effects, mostly to social and psychocological parameters. Camps are recognized as very effective way of patients diabetic education and self-care skills improvement. The same time all these effects strongly depend on appropriate medical management at camp. Camp can serve as a model of diabetes intensive treatment out of the hospital. It means, that adequate diet planning in spite of various physical and emotional activities, blood glucose intensive monitoring, everyday insulin doses

adjustment and diabetic emergencies prevention are necessary to provide campers with safe environment.

The diabetic camp is a unique possibility for campers to combine the summer holidays, intensive diabetes management and education. On another hand intensive monitoring of each camper gives us certain data, which upon proceeding, allows to optimize the diet planning, insulin dosage and physical activity individually. An active involvement of campers in the decision-making process rises their knowledge and motivation for taking good care over diabetes in everyday life.

## **Aims**

Aim of our study was to evaluate outcomes of intensive insulin therapy regimen at the Georgian diabetic camp.

## **Materials and Methods**

We started to run the Diabetic Camp for children and adolescent with Diabetes Type 1 in 1996. The total

number of participants in years 1996-2000 is 293. The 10-day sessions of the Camp were held in Mountain resort Bakuriani.

Insulin therapy regimen: in all patients was at least twice a day injections of Regular + NPH insulin. We used Humalog (Lispro) insulin by Lilly for extra shots as needed.

Blood Glucose (BG) was monitored routinely before each meal and at bedtime, as well as in every case of suspected hypo- or hyper glycemia, both indoors and outdoors. Individual record sheets were kept on every camper, carefully recording all the data about BG values, as well as insulin dose, diet and activity adjustments. The record-sheets were proceeded each year to evaluate an individual reaction of campers on the camp session, to evaluate the camp reflection in-group every year and in general.

As a main reflection of proper Diabetes management, we calculate Blood Glucose (BG) as daily average (Mean  $\pm$  SD) from the values before meals.

## Results

Comparison of BG levels from the first 3 and last 3 days of Camp sessions showed, that there are 4 major types of reactions campers: in some cases BG levels significantly improve at the end of the camp, in some cases they are stable good, in some cases are stable bad and in some cases they worsen. The percentage of the case distribution for each year as the mean is presented as *Tab.1*.

The results of our study showed, that in average 34% of the campers the improvement of the diabetes management could be achieved during the camp session, average 25 % of campers had stable good BG, average 32% of campers had stable bad BG any and in about 12 % of cases the diabetes management worsens (*Fig.1*)

We've studied the changes of insulin daily doses requirement during the camp session in these years. Results are presented in *Tab.2* in comparison to the starting dose at the first day.

YEAR	Improvement	Stable Good	Stable Bad	Worsen
1996	n = 17 (40%)	n = 10 (23%)	n = 12 (32%)	n = 4 (10%)
1997	n = 20 (33%)	n = 12 (20%)	n = 22 (37%)	n = 6 (10%)
1998	n = 23 (34%)	n = 14 (27%)	n = 32 (31%)	n = 8 (8%)
1999	n = 13 (33%)	n = 13 (32%)	n = 10 (25%)	n = 4 (10%)
2000	n = 23 (32%)	n = 16 (22%)	n = 25 (34%)	n = 9 (12%)
Mean	34%	25%	32%	10%

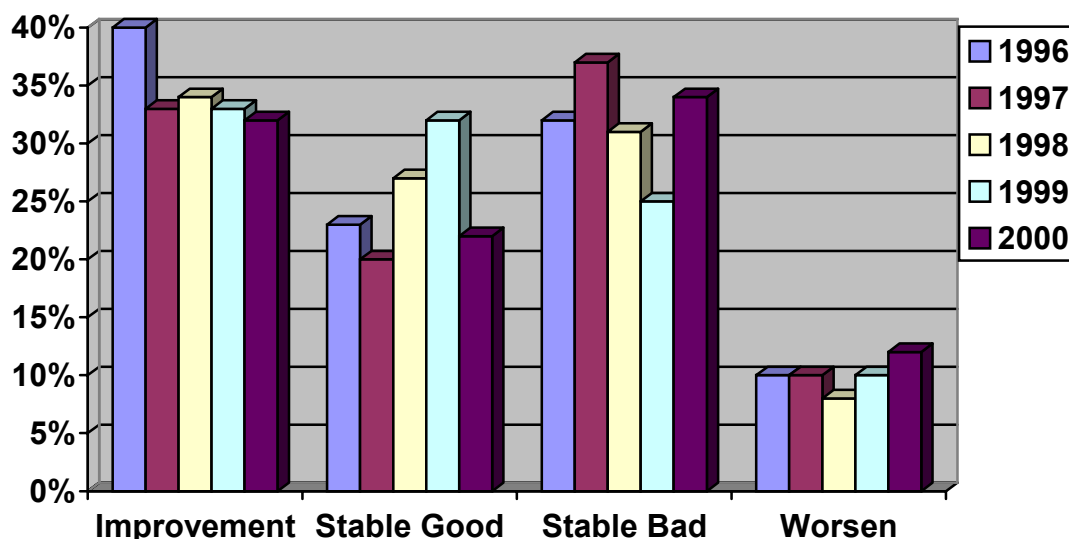
**Tab.1** *Diabetes management in campers at the end of camp session*

## Discussion

In the great majority of cases it was necessary to adjust the daily insulin doses for the optimal Diabetes management (1,2). Changes in direction of decreasing or increasing, are of the same importance and reflect a very intensive work to keep BG in acceptable range (3,4). None of them can be good or bad by it, without taking in account individual outcome of every change

(5). The cases, when doses remain unchanged, may reflect the intensive changes in Diet and (or) physical activity. Also unchanged insulin dose alone cannot be the criteria for success.

We had no cases of hypoglycemic or ketoacidotic coma during 5 years of camp activities. It is clear, that further study is necessary to find out some directions of individual changes and kind of characteristic for every single session.



**Fig.1** Daily occurrence of hypoglycemic episodes during the Georgian diabetic camp sessions in the years 1996-2000.

YEAR	Reduced	Increased	Unchanged
1996	60%	33%	7%
1997	24%	69%	7%
1998	58%	38%	4%
1999	58%	35%	7%
2000	52%	40%	8%

**Tab.2** Insulin daily dose changes average in campers at the end of camp session.

### Conclusions

1. At least twice a day injections of Regular + NPH insulin in combination with Lispro extra shots allows to avoid ketoacidotic a hypoglycemic coma during the camp session and to maintain optimal insulin daily doses in majority of cases.
2. BG daily profile is optimal for proper diabetes management at the camp.
3. Insulin daily dose adjustments are of different directions and hardly can be use as a criterion for camp outcomes measurement.
4. Intensive insulin therapy regimen at the camp is highly effective in meeting requirements of high physical and emotional activities of campers

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## **Оценка эффективности применения интенсивной инсулинотерапии в условиях диабетического лагеря Грузии**

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### **Р Е З Ю М Е**

За время существования (с 1996-го года) на летних сессиях диабетического лагеря Грузии приняло участие 293 детей и подростка с диабетом тип 1. Тактика интенсивной инсулинотерапии, применяемая в лагере, подразумевает применение минимум двухкратных инъекций комбинации инсулина с дополнительными подколками при необходимости. Осуществлялся интенсивный контроль гликемии в виде ежедневных измерений суточных профилей гликемии. Результаты исследования показали, что избранная тактика позволяет избежать осложнений клинического течения диабета в виде кетоацидотической и гипогликемической ком, способствует улучшению показателей гликемии в среднем в 34% случаев. По нашему мнению, тактика интенсивной инсулинотерапии помогает адекватно удовлетворить потребности возросшей физической и эмоциональной активности детей и подростков в условиях диабетического лагеря.

**Ключевые слова:** *диабетический лагерь, интенсивная инсулинотерапия, мониторинг*