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Research Article

Recognition of Initial Hunger for a Steady and Lower Preprandial Blood Glucose

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Abstract

Recognition of Initial hunger and associated low Blood Glucose (BG) was trained in 108 subjects who completed the training protocol of five months. Under 3 years were 41 subjects, 12 were between 3 and 6 years of age, 16 between 6 and 12 years, 17 between 12 and 18 years old and 22 were over 18 years of age.

Table 1 reports lunches and dinners in the five age groups in three categories: baseline, low and high intake of LEDF (Low Energy Dense Food, i.e., less than half prescribed amount; high LEDF, more than half prescription). The number of meals and LEDF content per meal are reported for each age-category subgroup. Figure 1 reports BG measurements before each lunch or dinner. Ordinates report BG before meals. The abscissa reports five different age/categories of BG measurements: 1. Baseline; 2. No compliance; 3. High compliance only with LEDF prescription; 4. compliance with programmed IH with low LEDF intake; 5. full compliance with IH and high LEDF intake. Low intake of LEDF is associated with a decrease of BG as compared to baseline; successful compliance with only low BG further decreases BG; the increase in LEDF has a doubtful effect.

Conclusion: Administration of abundant LEDF (more than half prescription) is effective in associating low BG although less effective than programming low BG. Abundant LEDF also prevents events of slightly depressed BG. The comparison was performed 5 times by observing BG changes in consequence of changing programs: only LEDF, only programming low BG.

Keywords: Hunger; Blood Glucose

Introduction

In the sixties, the Unit of Gastroenterology in the Pediatric Clinic of the University of Florence was charged with the treatment and recovery of children with chronic or recurrent diarrhea in the 2nd year of life. We conceived the grand lines of nutrition after reading the chapter on alimentary canal in the Handbook of Physiology [1]. This was published in those years by the Amer. Soc. for Physiology. Absorption was the most important moment in all steps from intake to replenishment of blood with nutrients. In capturing same nutrients, mainly energy and N, absorption was conceived as in competition with bacteria [2] Microflora persistence on duodeno-jejunal flat or normal mucosa in time after a meal in children. Physiol Behav 60: 1551-1556]. Few bacterial species can damage small intestinal mucosa out of thousands that have been identified in human intestine. At that time there was the fear for insufficient food administration and the impatience for seiggrowth. We decided to approximately cover the human requirement for energy, for protein/aminoacids and to cover other needs by exploitation of food variety. Protein coverage involved about 12 essential aminoacids. A 13th factor was the sufficiency of total protein nitrogen administration of about 50 factors that are necessary, i.e. cannot be produced in body tissues. 0.57 grams of protein per kg/day maintained N balance in 97.5% of adults. A person of 50 kg might require 28 g of protein Nitrogen per day. This Nitrogen is contained in 100 to 150 grams of meat. We can add to these requirements, the protein nitrogen increase for two kg of body weight growth in a year, 100 grams protein, i.e., 0.27 protein grams per day with about 0.05 grams of protein nitrogen per day. For a growing child, 0.62 grams protein nitrogen might suffice for a day. This amount can be found in 30 grams of meat protein and 150 grams of lean meat per day. The protein need shows probably also the need for vitamins and minerals in daily food. The amounts are very modest and easily covered by daily intake of about 800 daily kcal [13] Interruption of scheduled, automatic feeding and reduction of excess energy intake in toddlers. Intern J Gen Med 6:39-47. http://www.dovepress.com/article_12104.t15115810><http://www.ncbi.nlm.nih.gov/pubmed/23393411>]. You have to consider that all grains and vegetables have a protein content that is barely sufficient for survival. Hundred and fifty grams of meat per day cover probably also the needs for minerals and vitamins. Vitamin D however is different from other nutrients. It is central for bone, for hormones and energy metabolisms. Sufficiency is granted by sun exposition and there are doubts about compensation by intake in absence of sun exposition. We faced another question: the role of abundant LEDF on preprandial BG. The role emerged from.

Subjects and Methods

Design

The intervention was reproducible by complying with a main variable and a support variable. The main variable was Initial Hunger (IH) that was assessed by both subjective evaluation and biochemical measurement. The subjective assessment consisted of the recognition of the blood glucose by body feelings of bearable hunger and preprandial Blood Glucose (BG) measurement that was maintained between 3.9mmol/l and 4.7mmol/l. The support variable is more understandable and erroneously considered sometimes as the only compliance. Abundant vegetable intake is necessary to prevent hypoglycemia events in hyper-insulinemic patients waiting for IH. On the other hand, a high vegetable intake when BG is high is associated with the relapse of diarrhea, abdominal pain or headache [6]. Compliance with only one of the two prescriptions was associated with these undesirable effects, whereas the two prescriptions together produced a steady BG state for about 3 hours followed by bearable hunger in adults, i.e. the possibility of taking the subsequent meal before BG drops and hunger becomes unbearable [6-11].

Detailed descriptions of Initial Hunger, food intake, preprandial blood glucose measurements (referred as meal BG), and physical and social activity patterns were collected throughout the 5-month observation period. Phone calls were repeated at least for 7 days. 7-day home diaries, anthropometric measurements and clinical evaluations were obtained at baseline and every 50 days during intervention. The intervention required a certain amount of motivation, attention and discipline; therefore it recruited persons with high attention or sensitivity to their bodies who were willing and able to fulfill the protocol. Age associated differences in response to the educational intervention were investigated by dividing subjects in 5 age groups.

The meal was an event of energy intake separated by more than 2 hours from similar events in a day. The meals of each group were collected in pools. Breakfast in Italy usually has a different composition from lunch and dinner, and accounted for about 15% of daily energy intake in previous investigation [11]. Moreover, BG before breakfast often was significantly lower than before other meals. The relations between NSV and IH and BG at breakfast were therefore separately investigated from lunch plus dinner, at baseline and under intervention. Results on baseline shall be presented after collection of more data.

All meals under intervention were separated by those consumed either with or without preprandial IH and referred to as 'IH' and 'No IH'. The associations of IH under intervention differed from those before intervention. Results at baseline were therefore not mixed with those under intervention. There were similarly" V meals" and "no V meals". Meals from the same group of subjects were therefore collected in 3 categories: Baseline, IH and No hunger (table 1). Preprandial blood glucose (referred as meal BG) and intake levels were investigated in these 3 categories.

A pre-post comparison was made of anthropometric measures and diary reports at baseline and after 5 months. Findings in meal pools and anthropometric measures were compared among the 4 groups.

Subjects

Between 1989 and 1999, the Pediatric Gastroenterology Unit of Florence University limited recruitment of subjects to patients who were prepared for the intervention by interpersonal relationships or their physician. The Hospital Gastroenterology Unit served the outpatients. Healthy subjects who were 0.5 to 60 years-of-age were eligible. The clinical assessment of all patients consisted of a routine physical examination and diagnostic biochemical and microbiological evaluations to rule out disorders such as celiac disease, lactose intolerance, cystic fibrosis, inflammatory bowel disease, liver disease, pancreatitis, and bacterial and parasitic infections [6,11]. Those who had organic diseases, acute or relapsing conditions, were unmotivated, overweight or unreliable were excluded (see Validations). The subjects were healthy as judged from reactive C protein, white blood count, and absence of intestinal or other organ complaints. 131 subjects met these requirements. Of these, 23 were unwilling or unable to complete the protocol after learning and describing accurate compliance through phone calls. The remaining 108 subjects completed the protocol and were included in 5 age groups. The first 3 rows of table report number, mean age and gender. No subject had febrile disease or had used any drug or medication in the previous 3 weeks. Approvals from institutional reviews for human use were obtained from the Ospedale A Meyer, Firenze, Italy. Informed consent was obtained from all the subjects' guardians.

Intervention

High-energy-dense food was considered to be food with over 60-kcal/100 g, and fruit and vegetables were low-energy-dense foods. Fruit was defined as food under 45 kcal/100g (apples, pears, and oranges) and vegetables under 30-kcal/100 g [6,11]. 150 g of leafy vegetables per meal were prescribed for children younger than 2 years of age, 200 g for those between 2 and 8 years of age, and 300 g for those older than 8 year of age. Fruit and vegetable intake was united under the name 'Low energy-dense food' (LEDF). Vegetable dishes could be fresh or cooked and savored with tomato, onion and pepper, oil and mixed with other food. The mother evaluated the savor as pleasant. Fruits and vegetables were usually given to children as the first dish, except in presence of intense hunger. Tables with the energy content of food items were provided. The training for Recognition of 'IH' has been reviewed recently [14].

Assessments

Clinical assessments

Clinical assessments were performed for diagnostic purposes at baseline and 1 to 3 times within 5 months of intervention. These assessments served to evaluate each subject's clinical condition and to assess growth in children, changes in fat, and compliance with the study protocol.

Clinical assessments included standard hematological evaluations at baseline and at the end of protocol, urinalysis, urine culture, and examination of stools for occult blood, ova and parasites, antibodies to H. pylori (Vaira., *et al*. 1996), and bacterial cultures for potential pathogens. Children were examined to rule out other organic disorders such as those listed previously. Comprehensive biochemical profiles were obtained on all children. Measurements included serum albumin, hemoglobin, iron, transferrin, calcium, phosphorous, Cu, Zn, total- and HDL-cholesterol, triglycerides, alkaline phosphatase, ALT, AST, total IgA, IgG antigliadin and anti-Helicobacter pylori antibodies, and ferritin. Plasma folates, B12, and IgE also were determined, as were red blood cell volume, platelet, and eosinophil counts [6,11].

Anthropometry

Anthropometric measurements were obtained by standard techniques as described previously [6]. The length of 33 children less than 2 years old was measured at baseline and that of 20 children at the end of the investigation; height was recorded for older ones. Length and height were expressed as a percentage of median length (height)-for-age (NCHS, USA).

Weight was expressed as a percentage of the median weight-for-age (NCHS, USA). Weight-for-length/height was the individual weight divided by the median reference weight for the same height (NCHS, USA). Arm and leg circumference and skinfold thickness were measured, and muscle area was calculated [6].

Diary assessment

7-day home-written diaries reported hunger type recognition and BG measurements and served to estimate energy, fiber, fruit and vegetable intake, document the hours spent outdoors and in gym, and asleep, and environmental effective temperature (Wagner., *et al*. 1972).

All data were recorded on special forms supplied by the investigators. Space was provided for reporting 5 meal events. Further occasional intake events were joined with the nearest meal. Each caretaker or subject was instructed in food measurement and weighing by a dietitian. Meal initiation by either internal or external hunger was observed in the quarter-of-an-hour before breakfast, lunch, and dinner and reported in the diary by the caregiver or subject. The type of the hunger feeling was recorded (stomach, mood and mind, physical). BG was measured on a drop of total blood from a warm finger with an automated portable blood glucose meter (Glucocard Memory; Menarini Diagnostics, Florence, Italy) within a quarter of an hour, and often on willing children to better understand their expressions. The diary measurements made with the portable instrument were corrected by the ratio to the hospital laboratory, and the same lot of strips was used in the individual diary succession (see Validations). The meter is based on measurement of the electrical potential produced by the reaction of glucose with the glucose oxidase reagents on the electrode. The capillary values are reported in this presentation, which are 0.2 mmol/l lower than the venous plasma glucose. Food intakes were estimated by weighing or measuring foods before and after cooking (McCance ans Widdowson,1960). Measurement utensils were provided to the caretakers or subjects by the investigators and all portions after cooking and leftovers were weighed or measured. After this recording period, the subjects were contacted by the experimenter, and they reviewed the diaries, clarifying any ambiguities or missing data. No more than 15% missing BG values were allowed.

Intake data were analyzed with a computer program containing the nutrient composition of 600 commonly consumed foods

(McCance and Widdowson, 1960). Additional details have been published previously [6,11].

Validations

Fresh whole blood was drawn into heparin tubes at each diary. One sample was centrifuged immediately and analyzed in duplicate by a laboratory hexokinase method (Hospital autoanalyzer Synchron CX7). The allowed spread for this measurement was 1 - 2% from average measured in 50 regional laboratories every month. The second sample was tested with the portable instrument by the patient or the caregiver. Care was taken for a simultaneous measurement with the laboratory (Urdang., *et al*. 1999).

The variation coefficient (SD/mean) was 2.9% in the measurements with the portable instrument and 6.9% in the ratio between these measurements and the Synchron CX7 in 80 diaries. The diary measurements made with the portable instrument were corrected according to this ratio to Synchron CX7. The comparison was repeated on another sample when the difference was higher than 10%. Twelve subjects were discarded as inaccurate, due to over 7% variation coefficients in the measurements with the portable instrument. The subjects' hunger and BG evaluations were obtained at the moment of blood sampling, and the mean difference between estimation and corrected measurement of blood glucose level had no significant difference from zero. The mean error (SD) in this estimation was 7.0% ± 3.8% of mean measured blood glucose in adults and 9.9% ± 5.3% in children ($P < 0.05$). Bearable IH was perceived in the range of 2.9 mmol/l and 5 mmol/l.

Alternative

The Mean BG gives us the degree of abnormal elevation of energy availability, indicates the faulty meals and shows the completeness of the correction after changes in intake. Assessment of Mean BG protects the subject against the fear of hypoglycemia, an important factor in excess intake promotion. Overweight subjects were bizarre, sometimes they engaged in food restriction at recruitment and were incapable of any further decrease after training. In our hands, the measurements by a portable device were reliable. We measured BG by a portable potentiometer for whole BG measurement with the hexokinase method: Glucocard Memory; Menarini diagnostics; Florence, Italy. The adult subject had to personally measure BG with the portable instrument against the autoanalyzer in the lab as he/she did at home. The autoanalyzer obtained a mean ± SD of 89.9 ± 11.3 mg/dL (N = 85). Subjects measured 89.0 ± 12.5 mg/dL. The mean difference (0.9 ± 7.1) was not significant. On absolute values, the mean difference was: 5.7 ± 4.3 mg/dL with no bias. This new parameter of 21 measurements by portable device (Mean BG) was much, much more consistent in repeated measurements than a single fasting BG by autoanalyzer. In scientific demonstrations [6-9], Mean BG (the mean of 21 preprandial measurements reported by 7 d food diaries) opened an incredible wealth of associations with diseases.

Statistics

All meal observations from the same age group were pooled. Breakfast was continental and was investigated separately from lunch and dinner, which did not consistently differ from each other. Five breakfast pools and 5 lunch and dinner pools were investigated at baseline as well as under intervention, for a total of 5787 meals (Table 1). Preprandial BG associations were investigated in 3 meal categories: 1. Baseline; 2. No hunger, which might have been followed by a meal with either low or high fruit or vegetable content; 3. IH, which might be followed by a meal with either low or high fruit or vegetable content.

The following two issues were investigated:

1. The predictive role on BG by emergence of IH in comparison with No hunger.
2. Fruit or vegetable acceptance was consequential to BG measurement, and a correlation can express a causal role only by BG on low-energy-dense food acceptance. During a meal, a predictive role of low-energy-dense food acceptance on BG might be considered. The relationships between BG and meal energy intake and low-energy food intake were investigated by linear regression analyses. Moreover, each pool under intervention was stratified per quartile of low-energy food-acceptance, and BG was compared in quartiles. Here the purpose was to distinguish the predictive role of IH from that of low-energy food-acceptance with regard to BG decrease.

Values are expressed as means + SD in the text and as means + SEM in figures. The significance of differences and correlation was analyzed by two-tailed t-test analysis and was set at $P < 0.05$ (Armitage and Berry, 1994). Custom made software was used to calculate meal contents, average BG, anthropometric measures, and to prepare tabulated data for statistical analyses. The statistical analysis was performed SAS 6.11 (The SAS Institute Milan).

Results

Energy Low-energy dense food in meals with consumption of either more or less than 50% of prescribed amount under intervention vs. baseline.

Group (years)	0,5 – 3	3 - 6	6 - 12	12 - 18	> 18
Baseline N	432	149	261	228	339
Grams /per meal	35.2 ± 52.8	37.8 ± 56.6	44.7 ± 72.3	81.5 ± 94.8	118.7 ±129
Intervent	196	59	169	246	463
Low LEDF Grams /per meal	62.2 ±56.3	100.1 ±60.8	88.7 ±77.6	70.6 ±72.7	76.0 ±76.5
Intervent	673	251	435	272	332
High LEDF Grams /per meal	222.8 ±72.5	278.3 ±83.1	370.7 ±121.4	374.1 ±115.7	404.3 ±180.7

Table

n=number of meals; gr=grams of LEDF; LEDF=Low Dense Food; at lunch and dinner LEDF is vegetable

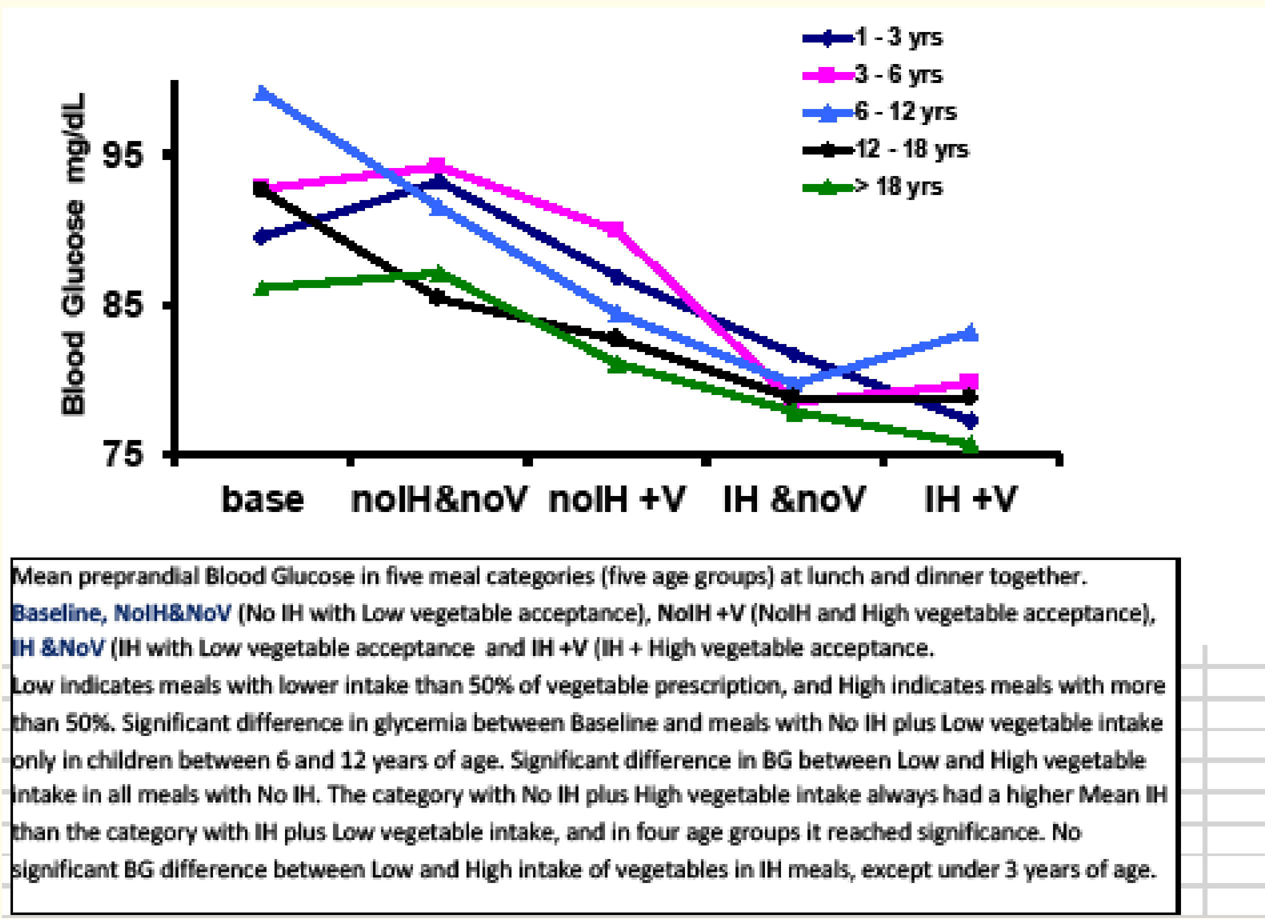

Figure 1: Mean (SEM) preprandial glycemia in three meal categories in five age groups at lunch and dinner together.

Verbal and written instructions on training were given during the third visit, just on the day of reading blood assessments. The training began with a week of phone calls on reports by parents and subjects and by approvals and corrections by the researcher. Many subjects improved and lost symptoms during these training days that included learning and checking BG measurements. At meals, conditioning became less frequent and Initial Hunger more and more frequent. A minor part decided to spare time, attention, efforts and ceased the phone calls, abandoning the training. Disappearance of motivating illness, lack of time or money, having already sufficiently acquired the skill to recognize metabolic feelings and recovery of wellbeing, produced follow-up dropouts in a total of 24.5% of subjects.

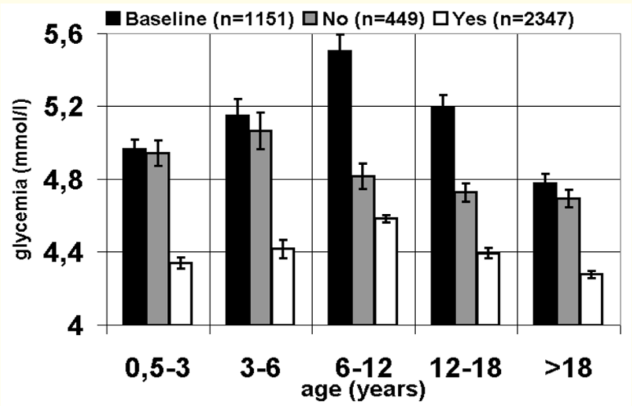

Figure 2: Numerical consistency of investigated meal pools.

Baseline

Figures 1 lists BG values at the meals that are object of this study and Figure 2 reports their numerical consistency. BG programming and NSV administration had similar and additional effects on preprandial BG and MBG. Preprandial MBG and energy consumption at breakfast were lower than at lunch and dinner although confirmed similar effects of IH and NSV on BG. Lunch and dinner BG values were similar and data from the two meals were presented together. The investigation was limited to the lunch and dinner pool that was adequately homogeneous and wide. Figure 1 reports effects of the two combined factors on MBG.

An effect of NSV on BG is shown in the first passage from NL (**N**o IH with **L**ow NSV) to the No-IH-High V situation: in this passage, only the amount of NSV is changed, being increased. In the two subsequent steps, an effect of IH on BG is shown by the addition of IH to either low or high NSV administration.

A particular mention deserves the age group of 6 – 12 years. They begin the meals with a customary BG of about 100 mg/dL and show a decrease in BG by no any measurable change in IH or NSV intake.

Reports on initial hunger

One to 15 training days served to learn the preprandial distinction in body feelings between those promoted by conditioning factors (appetite) and those emerging only after arousal of unsolicited signals of Initial Hunger (after meal suspension). The same type of feeling signaled Initial Hunger in the same subject for over 80% of instances, and sometimes 1 or 2 further types emerged in association with the usual feeling or substituted it. Stomach feelings often emerged together with modest change in cognitive activity. The cognitive sensation was usually mild, even transient, and without activity interruption. BG dropped below 3.0 mmol/l in 11 of 556 meals at baseline, and in 44 of 1298 meals under intervention (NS). The decrease under 2.5mmol/l was observed in 2 baseline meals and 7 under intervention (NS). Fainting or other complaints were not reported. The mealtime was suggested by the Initial hunger, and the meal or a fruit snack was consumed after a few minutes by infants, or in the successive hour in older subjects. Social habits and established mealtimes were maintained, so 11-30% of meals were eaten without Initial hunger. At mealtimes, the planning revealed to be successful in 70-89% of meals under intervention, i.e. Initial hunger emerged in these percentages before meal consumption. Intense or painful gastric emptiness emerged in 5 subjects with Helicobacter pylori infection for a few days during intervention. This altered epigastric perception was associated with inconsistent BG measurements, ranging from high to excessively low. Some handworkers reported physical weakness and used this signal as Initial Hunger onset. Strength and activity were soon restored with the meal and no loss of body weight was observed. Obsessive abstention from eating, mealtime postponement to increase hunger or ignoring Initial hunger with loss of meals was discouraged and was only occasionally observed in 6 adults.

Under intervention

Free choice of food type was maintained, except for planned limits in energy and partial substitution with low-energy-dense food. Significant decreases in energy intake from baseline and significant increases in vegetable intake were observed in all groups.

No difference in BG was found for intake between the first and second quartiles (below 50% of the prescribed amount) and between third and fourth quartiles (over 50%) of low-energy-dense food acceptance under intervention. Amount and association of intake of this food was reported after division of the meal pools in high (third and fourth quartile) and low intake (first and second quartile) under intervention. High intake was more than 5 times higher than baseline in 7 out of 10 meal pools, and the number of meals with high intake prevailed in all, except in adult pools.

The relationship between energy intake and low-energy-dense food was always positive in simple regression analyses, and always reached significance except in the breakfast pool of the children aged 12 to 18.

None of the subjects reported any deterioration in inter-meal behavior or in intellectual, physical or school performances. Infants showed a significant increase in weight and muscle area. All other anthropometric changes were not significant. Twenty out of 27 people considered lifelong maintenance of intervention feeding to be easy, and 5 were uncertain.

Discussion

The distinction between the recognition of IH from No IH recognition was the first objective of the present investigation, and the second was the use of both programming IH and high NSV acceptance as synchronic guides in feeding, the main compliances. The intervention included the suggestion of increasing gym activity, but no gym activity was verified indirectly by BG measurements. No BG lowering suggested poor compliance and poor physical and poor open air activity. The plasma glucose concentration (BG) represents a balance between in and out energy fluxes, and the IH recognition represents the subjective assessment of the same balance. Complying with the IH arousal means globally complying with energy balance and not with a factor alone in IH arousal (main compliance). The success in arriving to the meal in balance depended on many independent, indirect factors. The resting metabolic rate (-15.5%) and energy fecal loss (-3% to -4%) significantly changed under intervention [13]. Therefore, the energy flux into blood decreased. This BG decrease represented only a variable component of the all interplay in the maintenance of the glucose level, and sometimes it was negligible. Fruit, vegetable, fiber, gym activity and energy intake at the meal and with snacks could be manipulated [4-6]. NSV administration had the meaning of an instrument to facilitate the achievement of low BG that could also be achieved by intake of only energy dense food like pastries. Accepting NSV, children reveal low current BG. Thus NSV acceptance reveals properly low current BG and is of help in suspending energy intake for the programming BG decrease. The physical activity, hours-spent outdoors and the time interval could be programmed. Two factors acting in similar direction on BG might substitute each for the other, whilst two with contrary action might increase or decrease together without BG as well as energy balance change. Successful programming BG complied with all intervention (diabetes prevention) irrespectively of single balance factors like energy and NSV intake, environmental depression of expenditure and gym activity [5,6].

The arousal of Initial Hunger (IH) predicted a BG (or a MBG in a longer period of time) that was significantly lower than in absence of IH arousal in 7 out of 10 meal pools (2 of 5 breakfast and 5 of 5 lunch and dinner pools) at all ages under intervention. Humans may recognize a blood glucose level between 3.9 mmol/l and 4.7 mmol/l (70 and 80 mg/dL) by reflecting on own trained feelings, and this BG may represent a marker for the identification of Initial Hunger (IH). The arousal of IH was moreover associated with a 15% lower MBG and with 40% narrower variation under intervention as compared to baseline at all ages in the week diaries after the initial training period.

The BG ranges of No hunger and IH arousal partially coincided in the trained subjects or caregivers. Breakfasts of children between 3 and 18 years old were consumed within the few minutes between waking and going to school. Both lack of time and low importance given to this small meal might have disturbed evaluation between Yes and No hunger. Two overweight young women in another investigation reported no recognition of Initial Hunger 11 (Ciampolini., *et al*. 2000). However, they were able to predict the BG measurement with an error of 5.0%.

IH arousal, even with low consumption of fruit and vegetables, was associated with significantly lower BG than intake of high amount of fruit and vegetables with No hunger. Precise prediction of IH is more effective for BG decrease than meal energy dilution, although this partial intervention may correct gross balance errors. During normal free life, meals were consumed at usual mealtimes, a few were suppressed, and more often were consumed with No hunger. Ten percent of the meals were consumed despite No hunger in infancy and 30 percent in adulthood. These No hunger meals were small, suggesting a compensation of failed programming by the subject. The planning of the IH emergence (of Yes hunger) and the compensations during the subsequent meal allowed an adaptation of the meals to past customs and a possibility for a gradual change. A general negative relationship was found between BG and low energy-dense food intake and also between BG and energy intake in regression analyses. All these differences and correlations again prove the dominant role of the mind in feeding, and the possibility of cognitively adapting intake amount to current storage capability in humans (i.e. insulin sensitivity).

Weakness was occasionally reported during physical exercise and was considered as IH. This complaint suggested an earlier meal or energy intake increase. Loss of body weight was restricted to the fat component, and even this decrease was not significant in any of the 5 investigated groups after the 5-month intervention. Unbearable hunger was reported occasionally by OW subjects. BG reached lower levels than 3 mmol/l in 2.0% of baseline meals and 3.4% of intervention meals, and the difference was not significant. The subjects of the present investigation who were normal-weight did not complain of fainting or loss of conscience. Higher incidences of unbearable hunger, the associated loss of physical and mental strength, and fainting were observed in an investigation on 48 overweight children and adults [11]. The BG dropped under 3.0mmol/l in 8 overweight subjects, and 4 had an occasional fainting for less than 1 minute under intervention. The overweight subjects reported that fainting was even more frequent before the enrollment. These unpleasant and frequent events explained the diffuse hostility to the use of IH as a guide in feeding. The SDG events followed a day with consumption of negligible amounts of fruit and vegetables in the diary or phone calls with overweight subjects under intervention. The preventive effect on hypoglycemia by the consumption of copious vegetables is well known [7-11]. High fruit and vegetable intake represented the measurement of the 'support' compliance to prevent hypoglycemia and unbearable hunger. In the present investigation, fruit and vegetables increased up to 8 times in half of the meals under intervention as compared to baseline. The SD of BG decreased to 60% in the 10 investigated pool meals under intervention. The lower prevalence of hyper-insulinism in the normal than in the overweight subjects may explain the lower prevalence of these unpleasant episodes in the present investigation. On the other hand, the high fruit and vegetable intake in association with No hunger or in association with a BG over 5mmol/l produced abdominal pain and/or diarrhea in this and the previous investigation [4-6]. The use and even the investigation of either isolated factor produced failures and hostility. The combination is instead bearable and useful to develop prevention or reversion of diffuse western problems, like obesity and insulin resistance.

Most readers have no complaints and may consider Initial Hunger and intake decision a psychological event with psychological purposes and psychological consequences, and may not know how to perceive the bearable IH as it was described in this investigation. The explorative verification required a modest amount of responsible and intense mental work and important changes in eating behavior, including copious fruit and vegetable intake and BG measurements. This full understanding and the achievement of the emergence of IH (Yes hunger) before 70%-90% of the meals (as in present investigation) may be impossible and without any immediate motivation for many readers. On the other hand, "Most people can follow the present intervention if properly informed", "The intervention was less difficult than expected", "It may be maintained up to 95 years of age", and "It increased the perception of the 'self'", were typical reports by the investigated subjects.

Most humans develop risks and organ deterioration despite no complaints for many years. A flat small intestinal mucosa has often been observed in wellbeing celiac children during gluten feeding in our Unit. Vascular disease develops silently through years [14,15]. Inflammatory bowel disease may show anatomical lesions well after symptom regression [16]. In the present investigation, the subjects spontaneously contacted the Gastroenterology Unit to receive information on eating procedures. The subjects were healthy and all complained of subjective symptoms. A high sensitivity or a high attention to body feelings are associated with some scanty anatomical alteration in a minority of gastroenterology patients. The assessment of complaints in the present investigation [5,6] differed from those in the original reports [17,18]. The differences in assessment and geographical extraction seem negligible compared to the identity of presentation: i.e. a combination of somatic complaints with tests negative for any transient or permanent disease. This sensitive or attentive minority was the object of the investigation in this report. The selective recruitment explains the high compliance and low (18%) dropout rate in the investigated subjects, as well as their interest to these findings versus the indifference by the majority.

In conclusion, a significant BG difference between the assessment and the exclusion of Initial Hunger was shown in 7 out of 10 meal pools under intervention. IH was associated with a blood glucose level between 3.9 mmol/l and 4.7 mmol/l (70 to 80 mg/dL under intervention). This BG was 15% lower and showed a narrower variation as compared to baseline at all ages. The arousal of unbearable hunger and of BG decrease to 3 mmol/l were as rare as at baseline, and this usually allowed short delays, good planning intake, good adaptation to customary mealtime, and compensation for unexpected changes or errors. The maintenance of meal consumption at the customary mealtimes was preferred to the suppression of a meal for lack of IH (Yes hunger) in a fifth of the meals. The subjects considered lifelong maintenance possible. The investigated subjects did not represent a random sample of general population, but a minority with higher attention and sensitivity to their own bodies. Mothers of newborns are an example. The perception of the described feelings may be difficult for many adult people. Despite this lack of general application, present findings have a general interest for feeding strategies. The prevention of vascular disease by weight reduction may widen its application. Programming Initial Hunger might be a further step ahead.

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