Short Communication

Some Controversial Nutrition - Associated Aspects of Decompensation of Oncology and Diabetes Mellitus

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Today, 422,000,000 people are suffering from diabetes throughout the world (according to World Health Organization).
Diabetes mellitus in turn is the course of death of 1,600,000 people per year.
Taking into account the direct relationship between diabetes and nutrition, and in particular the carbohydrates consumption, this research provides an overview of the contribution of carbohydrates into the progression of diabetes mellitus specified by the country-associated features of diets.

In order to estimate the impact of carbohydrates on a clinical course of diabetes, specific issues of the proportion of carbohydrates in the diet of more than 20 countries were analyzed, and the following was detected:
with the additional 10% of consumption of carbohydrates in a daily

diet the percentage of mortality from cardiovascular pathology and diabetes mellitus increases significantly. Having the range of consumption of carbohydrates in different countries from 45% to 74% I selected 4 groups:
- **Group I:** with consumption of carbohydrates in the range of 45 - 49%; the mortality rate is 65 - 68 people per 100,000 people annually.
- **Group II:** is the group where carbohydrates constitute 50 - 59% of a daily diet; the mortality rate is 74 - 137 people per 100,000 people annually.
- **Group III:** is the group with contribution of carbohydrates 60 – 68%; the mortality is 199 - 229 people per 100,000 people annually.
- and, finally,
- **Group IV:** with the consumption of carbohydrates in the range of 69 – 74%; the mortality rate is 244 - 377 people per 100,000 people annually.

groups of carbohydrates consumption:
group I :45 - 49% contribution of carbohydrates in a daily diet
group II :50 - 59% contribution of carbohydrates in a daily diet
group III :60 - 68% contribution of carbohydrates in a daily diet
group IV :69 - 74% contribution of carbohydrates in a daily diet
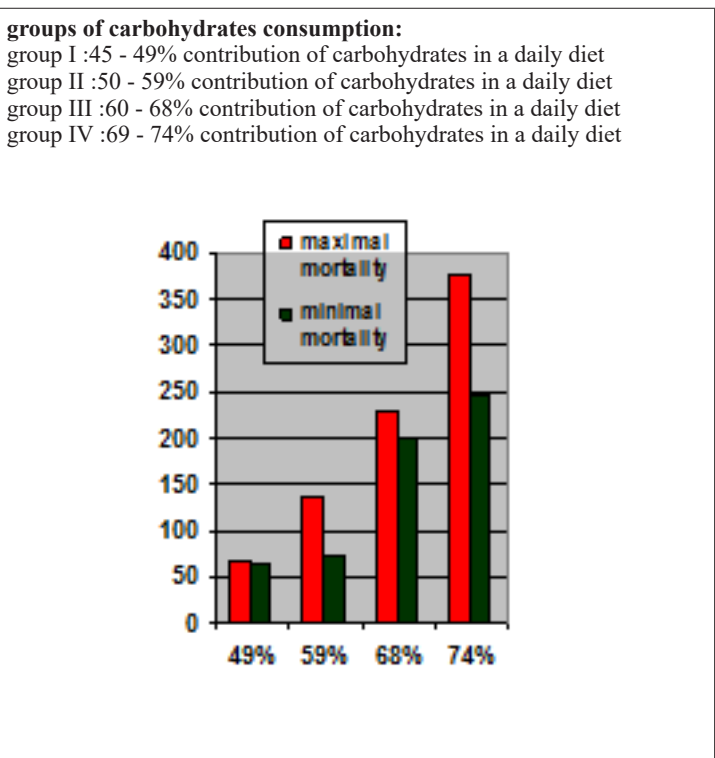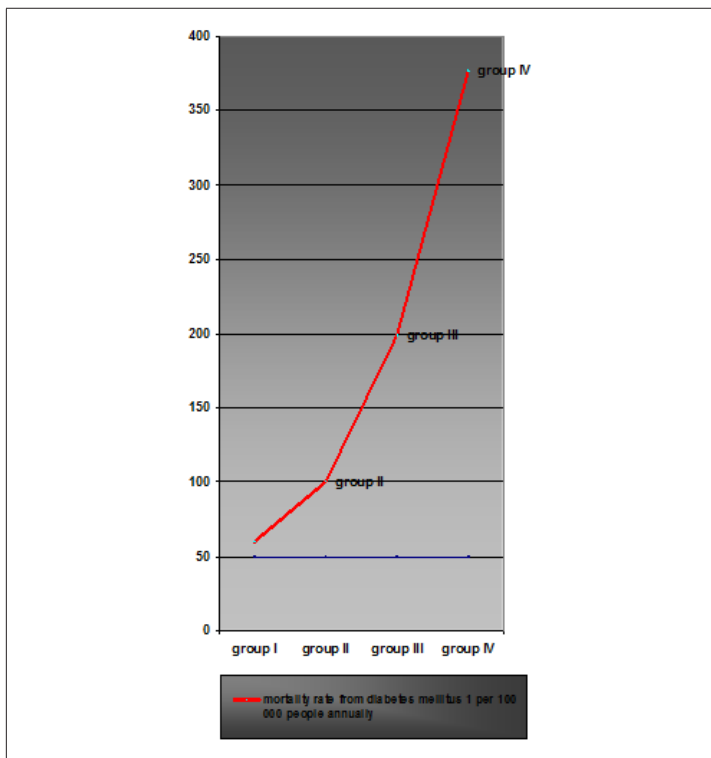
Thus, we can derive the next pattern: the mortality increases by third with the increase of carbohydrates intake from 45 - 49% to 50 - 59%, and then with the transition to the next group (with proportion of carbohydrates 60 - 68%) the mortality increases 3 times and further in the last group with the consumption of carbohydrates 69 -74% it increases 5 times.

So, if a conditional difference between mortalities in groups I and II is about 40 people per 100,000 people, so the differences between each of the subsequent groups are about 100 people per 100,000 people annually.

Let's check statistically the correlation between the percentage of consumption of carbohydrates [x] and mortality rate from diabetes mellitus [y].

1. The Spearman Rank Correlation Coefficient.
Rs value is 0.8907.
P value = 0.001 (99.9% - statistical significant level)
There is a strong and direct relationship between consumption of carbohydrates and mortality from diabetes mellitus.

2. The Kendall tau Rank correlation.
τ = 0.72. **Tcp =0.29**. Thus, **τ > Tcp**, we reject the null hypothesis.

Results
Rank correlation relationship according to 2 tests is significant. Moreover, countries with low daily calorie consumption have even higher rates of mortality from this disease: with the range of calories 2300 – 2770 Kkal/day – mortality is 244 to 377 people per 100,000 people annually and with the increase of daily calorie consumption to 2900 Kkal and higher - the mortality decreases to 114 - 217 people per 100,000 people annually with the same consumption of carbohydrates per day. And this rule is true for the full diet with the count of daily calories more than 3000 Kkal/ day to 3770 Kkal per day that is an average maximum of daily calories consumed in the USA.

Total Kkal per day					
contribution of carbohydrates in a daily diet	2300-2600	2610-2800	2810-3100	3110-3300	3310-3770
group I 46 -49%				68	65.3
group II 50 -59%				99	99.6
group III 60 -68%		229	175.6	214	
group IV 69 -74%	309.7	304.5		303	
rates of mortality from diabetes mellitus 1 per 100 000 people annually					

Let's check the empirically obtained data of correlation between the mortality from diabetes mellitus and total amount of calories per day via obtaining Spearman Rank Correlation Coefficient and Kendall τ Rank Correlation.

1.Spearman Rank Correlation Coefficient
R s value = - 0.7207 P value = 0.001 (99.9% - statistical significant level.)

There is a strong negative correlation between the mortality from diabetes mellitus and total amount of calories per day.

2.Kendall τ Rank Correlation: **τ = - 0.51. Tcp = 0.29**.
As τ takes values within -1 ≤ τ≤ 1; where τ =1 displays the strong direct linear dependence; τ = -1 - the strong negative linear correlation.

Thus, **τ > Tcp**, we reject the null hypothesis.
Results: Rank correlation relationship according to 2 tests is significant.

Now we can go to the contribution of proteins to our health.
The modern conception is that proteins can potentiate the development of cancer. The proof presents statistical data where we can see the following:
in the countries with a little (9% and lower) consumption of proteins in a daily diet there is less morbidity and mortality from cancer than in countries with higher percentage of protein consumption.

For example:
India – protein constitutes 8% of a daily diet.
Morbidity is 106.6 per 100,000 people; mortality is 108 per 100,000 people.
Mexico: protein – 11% of a daily diet.
Morbidity is 138 per 100,000 people; mortality is 94 per 100,000 people.
Thailand: protein – 9% of a daily diet.
Morbidity is 170.5 per 100,000 people; mortality is 136 per 100,000 people.
China with amount of a daily protein – 9% and with morbidity is 173.9 per 100,000 people; mortality is 122.2 per 100,000 people.

There are numerous similar countries like Egypt, Vietnam, Nigeria with low rates of consumption of proteins and with low rates of morbidity/ mortality. It would seem obvious – the less protein the lower the incidence of cancer. But it is incredible, we all know that patients after surgery and with hypoproteinemia decompensate rapidly, and it also is a reason of early and late surgery complications and ultimately the death of the patients.

Moreover, among the countries with low rates of consumption of proteins Russia stands apart – with the amount of daily proteins of 9% we have the highest rate of morbidity; for example: Samara region - the morbidity is 508.5 per 100, 000 people and the mortality rate is 210 people per 100, 000people.

On closer examination one may wonder: why in the data from the countries with the best statistic of mortality / morbidity from cancer there is so little difference between the morbidity and mortality? The percentage of mortality from the morbidity varies from 68% in Mexico to 101.3% in India, whereas in countries with high incidence of cancer this percentage varies from 29.9% to 49%.
How could they obtain such lethality?

In order to have the right to use the percentage of mortality from morbidity as a coefficient, we should determine if there is a significant correlation between them.
1. The Spearman Rank Correlation Coefficient.
R s value is 0.7936.
P value = 0.001 (99.9% statistical significant level)

There is a strong and direct relationship between the mortality and morbidity from cancer.

2. The Kendall τ Rank Correlation
$\tau = 0.63$. Tcp $= 0.33$ Thus, $\tau >$ Tcp we reject the null hypothesis. Results: Rank correlation relationship according to 2 tests is significant.

So, we can return to the obtained data where the countries with both low rates of consumption of proteins and levels of morbidity have the highest percentage of mortality from morbidity. Taking into account the absence of special and widely spread, especially malignant forms of cancer throughout those countries we can assume that these are the results of detection and registration of a narrow range of this pathology and mainly in the stages of decompensation, whereas in the comparison group of countries cancer mortality may even be slightly increased because in the conditions of presence of cancer and absence of an acute competing pathology the cause of death is cancer, even in senile age of a patient.

Thus, having eliminated the data from countries with the percentage of mortality from morbidity higher than 60% (as there is no reason to assume such exclusively high proportion of mortality as being the consequence of only specificity of cancer of those countries, but rather mostly the consequences of the low level of detection of different forms of cancer) we can see the following:

percentage of protein in daily diet	9%	12%	13%	16% and more
average value of morbidity per 100 000 people	810	310.38	229.4	179.4
average value of mortality per 100 000 people	199.5	136.4	128	90
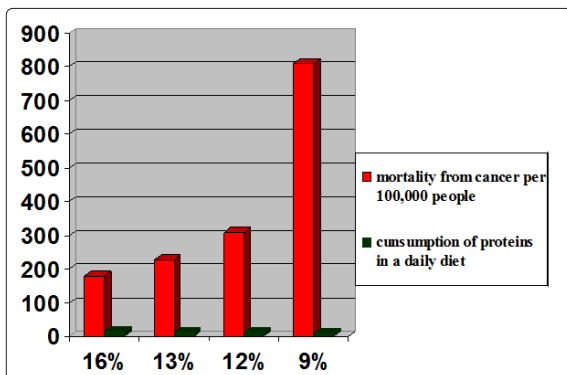
According to the statistics about 45% of all patients who are under hemodialysis, are patients with diabetic nephropathy. We cannot overestimate the importance of such a complication of diabetes as nephropathy that aggravates this disease in 40% of cases and is the main cause of death of the patients with the diabetes type1 and the second reason of death of the patients with diabetes type 2.

Thereby, the question is raised about the experience of formation of permanent native vascular access for the patients with the terminal stage of diabetic nephropathy. The distinctive feature of these patients with diabetes is a tendency to purulent-necrotic complications. But with the presence of the common trend to create fistulas by graft

all over the world this is a very aggravating situation, because on the one hand these patients really have affected peripheral arteries, often with a small diameter that is difficult to form a "viable" native, especially distal, vascular access; and on the other hand the frequency of angiogenic sepsis in the zone of artificial permanent vascular access is 13.2 % - 29.5%.

Speaking about native arterio – venous fistulas, on the foreground is the size of vessels, because, according to the most recommendations it cannot be smaller than three millimeters. However, this approach eliminates even the probability of fistula formation for a large number of patients with diabetes mellitus type one, and insulin – type diabetes mellitus who are in need of hemodialysis. The second are the stages of formation of the fistulas (they must be put gradually and alternately, from the level of wrist joints to the shoulders with the increase of the vessels diameters, beginning from a non - dominant extremity and through the each third of anatomic region on the upper limb

I.   In cases of reconstructions of fistulas in connection with aneurismal transformation of vein, there is no reason to retreat to third of anatomic region of the extremity or operate on the other limb; it is often possible to form anastomosis with slightly extended tributary veins so as to form an ascending or even descending anastomosis. In the anastomosis with such "accustomed" to the turbulent arterialized bloodstream veins, the maturation process is going significantly more quickly.
II.   If the thrombosis is the result of hypovolemia - thrombectomy would be sufficient measure of medical assistance.
III. If the reason of the thrombosis is a low blood flow rate in the artery we should either do the same anastomosis on the dominant hand or perform the reconstruction more proximal with forming long extensive anastomosis.

The methodology of these operations is various and involves all types of anastomoses ("end to end", "side in side" and "end to side" for each of the vessels).

Based on my personal opinion, the anastomoses created by "end to side" type are functioning in the best way.
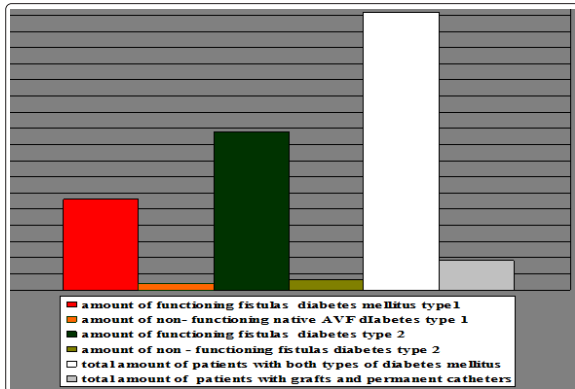I would like to mention that forming the anastomoses by "end to end" type with cutting off the arterial end is impractical for several reasons:
- Turbulence of blood flow in this type of anastomoses is relatively low
- The cut off the arterial end on the forearm eliminates the opportunity to form fistulas with another artery and frequently with the artery where the anastomosis was formed before.

Relying solely on the experience of formation of native arterio – venous fistulas, I can argue that fistulas can mature and function for a long time when are formed in the conditions of diabetes of both types and even with vessels with the diameter 1 millimeter or even a bit smaller. Based on my statistics, for the period 2015 – 2019, only in one department of dialysis 86 patients with diabetes mellitus were operated on. Originally, permanent tunnel catheters were implanted to 4 patients in accordance with the severity competitive/ cumulative diseases. Of the remaining 82 patients 30 were with diabetes type 1 and 52 with diabetes type 2. Thus, the number of native arterio – venous fistulas which were able to mature in the group of patients with diabetes of both types is 93.91% [1-7].

For the group of patients with diabetes type 1 the number of non - functioning native AVF is 6.7%.

For the group of patients with diabetes type 2 the number of non - functioning native AVF is 5.8%.

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Conclusions

1. There is a strong and direct correlation between percentage composition of carbohydrates in a daily diet and mortality from diabetes mellitus and cardiovascular diseases.
2. The mortality from diabetes mellitus and cardiovascular diseases increases by third with the increase of carbohydrates intake from 45 - 49% to 50 - 59%, and then with the transition to the proportion of daily consumption of carbohydrates to 60-68% of daily diet the mortality increases 3 times and further, with the consumption of carbohydrates of 69 -74% per day it increases 5 times. This rule is true for both types of diets: with the count of daily calories more than 3000 Kkal/day to 3770, Kkal per day and for low daily calorie consumption with the range of calories 2300 – 2770 Kkal/day.
3. There is a strong negative correlation between the mortality from diabetes mellitus and total amount of calorie per day. The countries with low daily calorie consumption with the range of calories 2300 – 2770 Kkal/day have even higher rates of mortality from this diabetes mellitus and with the increase of daily calorie consumption to 2900 Kkal/day and higher the mortality decreases significantly.
4. There is a strong and direct correlation between morbidity and mortality from cancer. The countries with both low rates of protein consumption and levels of morbidity have the highest percentage of mortality from morbidity.
5. In group of countries where the percentage of mortality from morbidity is lower than 60%, an average value of morbidity decreases from 810 people per 100,000 people with the consumption of 9% proteins in a daily diet to 310.38 people per 100,000 with a proportion of proteins in a daily diet of 12% and further to 229.4 people per 100,000 people with the daily consumption of 13% proteins and to 179.4people per 100,000 people with the consumption of proteins 16% and more per day.
6. The optimal permanent vascular access for patients with diabetes mellitus is a native arterio – venous fistula, because of the ability of native fistulas to become maturated in more than 90% of cases and of particularly absence of purulent-necrotic complications of this permanent access (Figures).