

THE STUDY OF SOME BIOCHEMICAL PARAMETERS IN PATIENTS WITH MULTIPLE MYELOMA

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Abstract: This paper presents the results of some biochemical parameters obtained in the laboratory of “Elena Beldiman” Emergency Hospital Barlad, and in the “Dr. Stoian – Dr. Ungureanu” Private Medical Practice on 10 patients diagnosed with multiple myeloma during 2005-2011. Numerous researches over serum proteins with the help of various methods (refractometry) have shown the presence of some changes in protein fractions of blood serum. These changes express the change of the normal ratio between these fractions, that means disorders in colloidal structure of blood. The results of the electrophoresis analysis, also in accordance with those from the scholarly literature, show that the changes in the condition of the blood serum are due to the increase in the globulins fractions which is linked to the growth of the immunological processes, the antibodies synthesis being especially closely linked to gammaglobulinic fraction.

INTRODUCTION

The study of the protein metabolism in this disease began in 1928 when it could be noticed the presence of a hyperproteinemia; but, huge progresses were made at the same time as the electrophoresis was introduced in the medical practice. The present paper has as main objective and aim the study of changes in some biochemical parameters in 10 patients with multiple myeloma as both primary and secondary diagnosis. From a quantitative point of view the variation of these biochemical parameters according to the age and gender was recorded on the patients from Elena Beldiman” Emergency Hospital Barlad and from „Dr. Stoian – Dr. Ungureanu”PMP in 2010. It’s appreciable the the life duration of the patients with multiple myeloma, under various statistics, from several months to 10-12 years, from the moment the diagnosis was set ((BUTOIANU, E., STĂNICĂ, T., 1973), 10-15 years (MUT POPESCU, D., 2003).

MATERIALS AND METHODS

The studies were carried on a casuistry which consisted of 10 patients diagnosed with multiple myeloma between 2005-2011 (5 women and 5 men), aged between 54 and 79 years. Blood samples were gathered in biochemistry vacutainers, and then spun in „EPPENDORF”5804 centrifuge. The samples were operated with the help of the dry biochemistry analyzer „System Chemistry „VITROS 5.1.F”. During the comparative study of the investigated cases, the ages and genders of the patients were correlated with the values of the following biochemical markers: the amount of glucose in blood (mg/dl), and the amount of calcium (mg/dl). The amount of glucose and the amount of calcium were determined with the help of the biochemical autoanalyzer „VITROS 5.1.FS”Chemistry System. VITROS 5.1 FS Chemistry System can process discrete photometric methods and can perform automatic dilutions using a sample aliquot from the first tubes collections. In the Special Chemistry Center of VITROS 5.1 FS MicroTip the volume of the liquid reagents is mixed with the volume of the samples in a cuvette and incubated for a certain time period. A second reagent, if is requested, is added and absorbance measurements are performed on selected time periods. Absorbance measurement is converted to concentration through an appropriate mathematic pattern and an associated calibration. Data are processed using a user defined algorithm. This photometric process consists of following some steps: a second metering takes over VITROS Versa Tip; the reagent supply spins until it gets to the most appropriate reagent/ diluent from the metering track; the second metering absorbs R1 from the reagent supply; it dispenses R1 in the cuvette, absorbs the sample from Cuve Tip, it distributes it in the cuvette and performs the mixture. The cuvette is incubated in order to warm up the mixture. A cuvette palette is moved towards the metering place in order to mix the fluid. The second metering seals and dispenses VITROS VersaTip, and takes over FS MicroTip. The aliquoted sample from Cuve Tip is placed for metering by Tip Processing Center. The second metering seals and dispenses Fs Micro Tip, and takes over FS MicroTip or VITROS VersaTip. After the cuvette is read, the unused cells can be used for additional tests or sent to residues, in the case when all the cells have been used. The cuvette is read and the results are calculated. The cuvette’s arm moves the incubated cuvette in order for the position to be read. The cuvette is being incubated until the read is requested. The second metering dispenses R2 liquid in cuvette and performs the mixture; it absorbs R2 from the reagent supply; the photometer places the filter in order to be read. The second metering seals and dispenses Tip. The reagent supply spins toward the most appropriate reagent/ diluent from the metering place. The information about the Reagent Lot must be inserted prior a reagent to be loaded into the system. The reagent is enclosed into a reagent package and a bottle in the Edit Protocol Parms screen, when REAGENT Protocol is selected. If the user defined method has the potential of discovering a antigen excess condition, it is recommended that the user to define an appropriate method in order for the

system to discover such a condition. The antigen excess refers to the region of the response curve of the assay dose where the concentration of analyte (antigen) exceeds the effective concentration of reaction antibodies, inhibiting the agglutination reaction.

RESULTS AND DISCUSSION

Mentionable is the fact that these studies were performed on a heterogenous casuistry on patients from both genders, aged between 54 and 79 years during the year 2010, and caught in various tages of disease development having multiple myeloma as main and secondary diagnosis. Consequently, the deviation degre of the studied biochemical parameters values differ more or less from one patient to another.

Table 1: Distribution of multiple myeloma cases after diagnosis

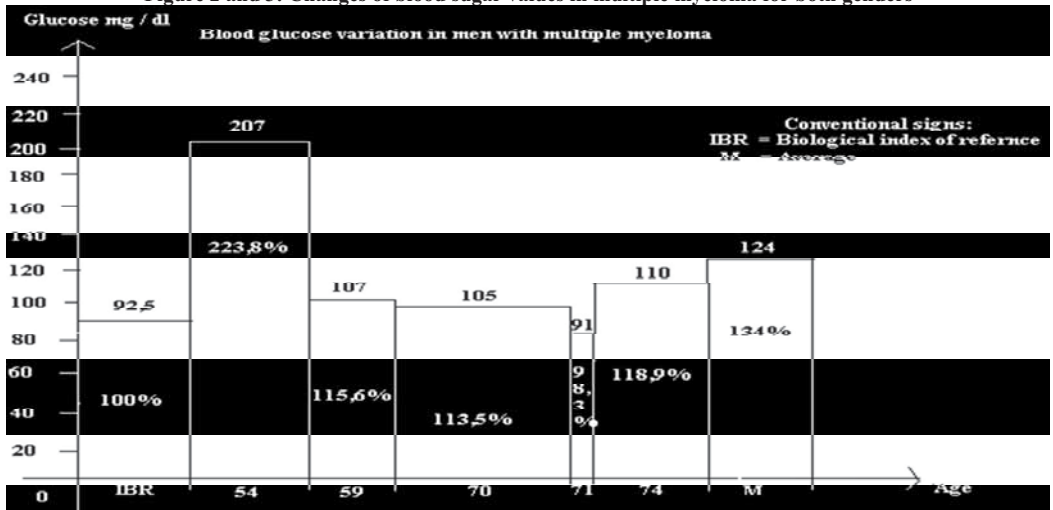
| All cases | Main diagnosis | Secondary diagnosis |
|-----------|----------------|---------------------|
| 10 | 3F + 3B = 6 | 2F + 2B = 4 |

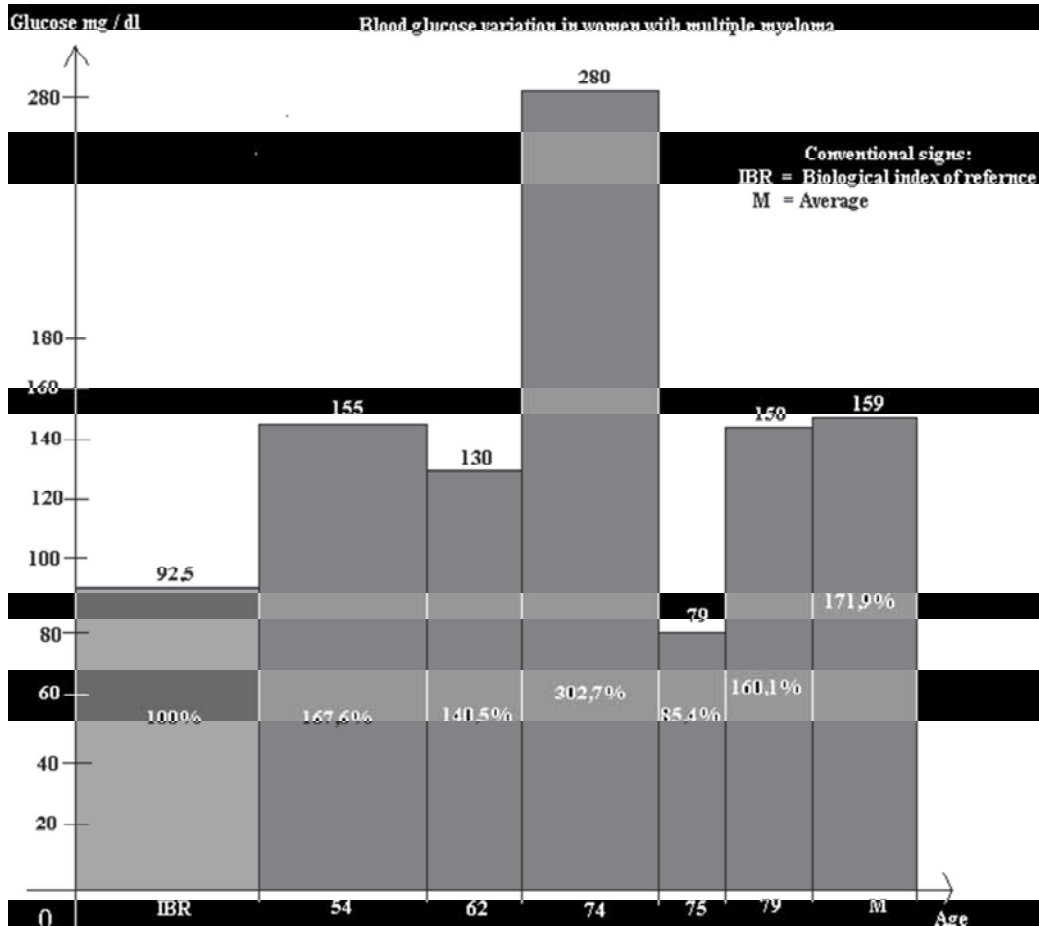
Conventional signs: F – female cases diagnosed with multiple myeloma

B – male cases diagnosed with multiple myeloma

Seric glucose - being an organic non nitrate blood component, the sampling for glucose determination was made in vacutainers which contained sodium fluoride in order to prevent coagulation and glycolysis (MIHELE, D., 2007), *hyperglycemia* , representing a main feature of sweet diabetes which is also a cause of cardiovascular complications and renal impairments. *Hypoglycemia* occurs when the alimentary contribution level and digestive absorption level decrease, but also when the catabolism of some hormones decreases. Seric glucose determination is necessary in order to diagnose sweet diabetes or to monitor some impairments.

Figure 2 and 3: Changes of blood sugar values in multiple myeloma for both genders



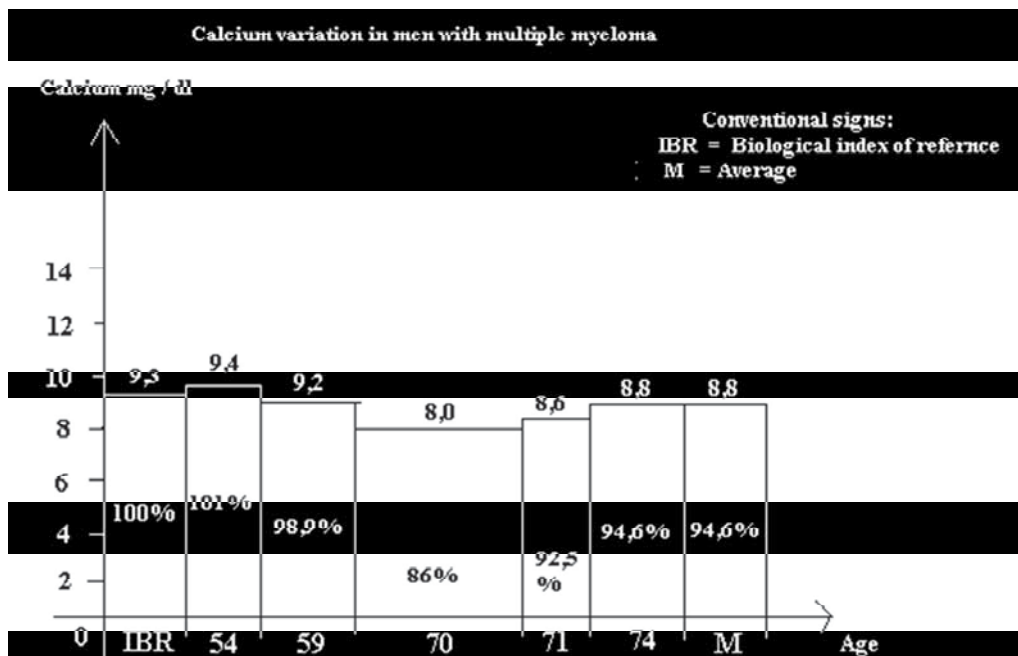
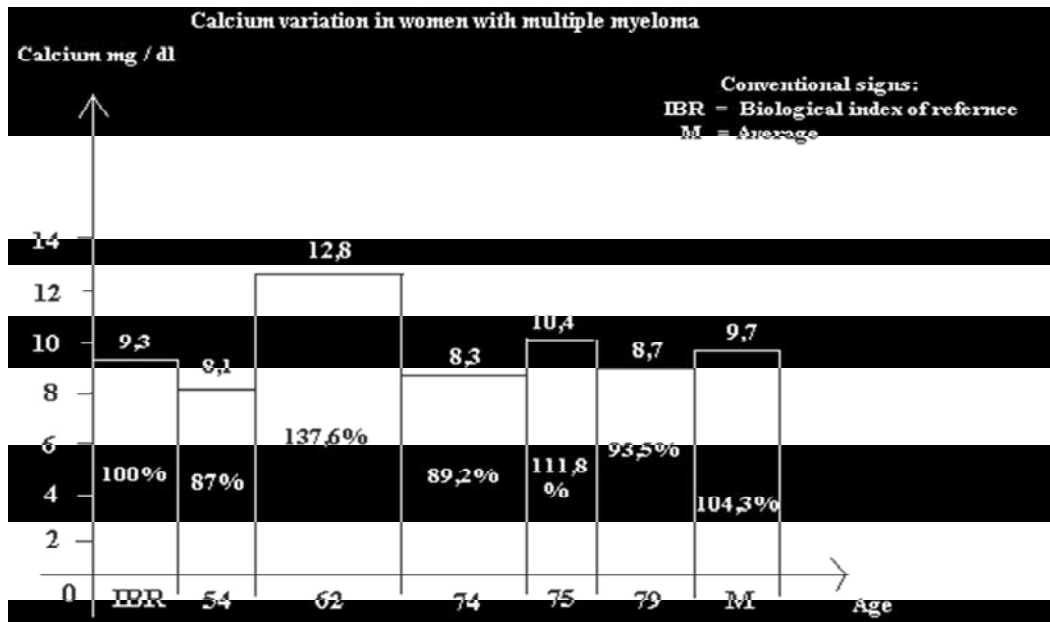


The normal physiologic values of blood sugar perceived by System Chemistry VITROS 5.1.F, the dry biochemistry autoanalyzer for both genders situate between 65 – 110/mg/dl with an average of 92,5 / mg/dl.

Calcium — belonging to inorganic constituents, Calcium is a prevalent extracellular divalent ion. It can be found in plasma, taking both an ionized shape (free) and an unionized shape, bound to the plasmatic proteins (MIHELE, D., 2007). *Hypercalcemia* may be caused by long bed reposes due to a diminution of bone development. This fact leads to a reduction of calcium deposit in bones while the efflux from bone remains constant. When we talk about the healthy subjects we must say that the excess of calcium is being eliminated through urine while when talking about the affected subjects it was noticed that calcium accumulation was taken place within the extracellular compartment, in this way determining hypercalcemia. *Hypocalcemia* may be a cause of the reduction of calcium intestinal absorption, having as main sublevel the reduction of the amount of vitamin D, increase the amount of phosphates in intestine which can couple the calcium. Calcium represents a bone main component (90%), being a reservoir in order to maintain the level of seric calcium.

KDOQI Guide , referring to reference intervals for Ca, recommends keeping the corect calcaemia toward the low limit of the reference interval (8,4 – 9,5 mg / dL) and to not exceed 10,2 mg/dL). NFK – K/DOQI Clinical Practice Guidelines for Bone Metabolism and Disease in Chronic Kidney Disease, 2003).

Figure 4 and 5 : Changes of calcaemia values in multiple myeloma for both genders



The normal physiologic values of the calcaemia perceived by System Chemistry VITROS 5.1.F, the dry biochemistry autoanalyzer for both male and female situate between 8,4 – 10,2 /mg/dl with an average de 9,3 / mg/dl.

CONCLUSION

After having carried this casuistry, related to age, it could be noticed that a presence balance of the multiple myeloma for both genders is maintained.

In the case of women's blood sugar, from those 5 studied cases, a moderate hyperglycemia was recorded in 3 patients, a marked one in one patient and only a glycemia value which was situated between the normal physiologic limits.

If we refer to the average value, a growth of the blood glucose over the average was noted at one from the 5 surveyed cases.

In the case of the male patients, the glycemia values are lightly over the normal range on 3 patients, one of them having a value situated between the normal limits, and in one case an outstanding value of glycemia could be noticed.

Remarkable is the fact that for most of the patients with multiple myeloma the values of blood glucose are high because of the changes in glucidic metabolism.

These changes on glucidic metabolism level are due to a blockage of glucose metabolism and of all the possibilities to be used by cells.

In the case of the female patients it could be noticed a variation of calcaemia values, as it follows: one case of moderate hypercalcaemia, one of a noticeable hypercalcaemia, and the rest of them being situated between the normal physiologic range.

In the case of male patients, just in two cases of five it could be noticed a moderate hypercalcaemia while the rest of them showed values of calcium which situate between the normal physiologic range.

The changes in calcaemia values are due to the presence of the lysis process and bone demineralization process.

The observational studies and lab researches point out the fact that the changes of biochemical parameters in this disease assume the existence of some particular clinico-biological disorders that can be influenced by various factors.

These aspects can be explained by the fact that most of the risk factors are common (diabetes, arterial hypertension, dyslipidemia) that in the end determine the progression or regression of the disease.

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