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Assessment of Awareness Regarding Osteoporosis Prevention in a Group of Pre-Menopause Women

Olivera LUPESCU¹, Narcis MARCOV²

Abstract

Osteoporosis (OP) is nowadays considered one of the most important health care problems due to its frequency and due to medical and socio-economic consequences of its major complications, fragility fractures. The Global burden of OP has not been completely described yet, but the most recent data regarding incidence, morbidity, mortality and costs of these fractures resulted in a considerable increase of interest towards its prevention. Establishing proper prophylactic measures requires an organized social intervention, at several levels, focused on health care providers, but including a complex network of institutions and structures. One of the key points for an early effective intervention refers to improving the knowledge of the potentially exposed persons, so that they could actively be involved in prophylaxis. This paper analyses the degree of awareness regarding risk factors for OP in order to establish proper strategies able to decrease the incidence of this condition and, thus, its complications. Since the incidence of OP is maximal in post-menopause women, the target group was represented by women before 45 years old treated for non-osteoporotic fractures in a Level 1 Trauma Centre. This research showed that the risk factors are unequally known, that the primary health care services only partially fulfill their preventive and educational role and the compliance to medical recommendations is not proper. Therefore, future directions for decreasing the impact of OP can be established, targeting enhanced health education by stakeholders, as well as increased material resources from our society for prevention activities.

Keywords: osteoporosis, fragility fractures, risk factors, osteoporosis prophylaxis, quality of life.

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Introduction

Osteoporosis (OP) is described as a loss of bone mass accompanied by structural alterations of bone tissue; quantified by scores, these alterations are classified as osteoporosis (alterations more severe, higher score) and osteopenia (alterations less severe, lower score), both decreasing the resistance of bone and impairing the quality of life by producing disability, this being the main consequence of osteoporosis (Ferrari et al, 2012). Disabilities can be minor (persistent and invalidating pain due to osteoporosis) but still affecting the ability to work or to fulfil social requirements, or major, produced by osteoporotic fractures, also described as fragility fractures (Kanis, 2000). Although it can affect also male gender, osteoporosis appears most frequently in post-menopausal women, and becomes more severe with age.

The most important clinical impact of OP is generated by increased risk of fractures with direct action upon the quality of life. Osteoporosis-associated fractures are called *fragility fractures* (FFx), occur after minor trauma, like falls from standing; the most severe are vertebral fractures (which produce irreversible and extremely painful deformations, thus making difficult even the daily activities) and hip fractures, which need surgical treatment, with considerable risks due to the status of the patients, threatening even the life of the patient. Under these circumstances, the interest for OP increased, thus being described three major factors describing the severity of its' socio-economic impact: the incidence, the disability and the costs. OP is estimated (Kanis *et al.*, 2013 a) to affect approximately one-tenth of women aged 60, one-fifth of women aged 70, two-fifths of women aged 80 and two-thirds of women aged 90, thus becoming a matter of public health care. Recent data (Svedbom *et al.*, 2013) show that in 2010, in the EU, 22 million women and 5.5 million men were estimated to have OP, and this incidence is expected to increase, one of the major reasons being the global increase of the average age of the world's population, as it is expected (Cauley, 2013) for the population older than 65 yrs to double between 2008 (about 506 million) to 2040 (1.3 billion).

The disability due to OP is mainly related to fractures. Worldwide, 40% of osteoporotic fractures occur in people of working age and that 1 in 3 women over 50 will experience OP fractures, as will 1 in 5 men (Kanis et al 2012, Svedbom et al 2013). As for the EU, a report established by the European panel of the International European Foundation (IOF) that in the EU, 3.5 million new FFx occurred in 2010, with a total of 1180000 Quality-Adjusted Life Years (QALYs) lost due to previous and incident OP fractures (Svedbom *et al.*, 2013). More than that (Hernlund *et al.*, 2013, Svedbom et al 2013), IOF evaluated that the disability due to osteoporosis is greater than that caused by cancers (with the exception of lung cancer) and is comparable or greater than that lost to a variety of chronic non-communicable diseases, such as rheumatoid arthritis, asthma and high blood

pressure related heart disease. As for the costs, the Report of the EU panel of IOF (Hemlund *et al.*, 2013; Svedbom *et al.*, 2013) estimates that the economic burden of the FFx is €37 billion.

The most impressive and severe problem to be discussed is mortality after a hip osteoporotic fracture, which has been estimated about 5-10% within one month, and around 20%-30% of patients die within one year and the total estimated 5-year mortality was 39% in women and 51% in men (Cooper *et al.*, 2011; Strom *et al.*, 2011). Multiple factors are responsible for the expression he/she died after a hip fracture and very few of them can be influenced once the fracture occurred; severe comorbidities (more or less treated) which considerably increase the surgical and anaesthetic risk, followed by bed-ridden related complications (sores, dehydration, pain-induced stress reaction with cardiac and cerebral consequences), as well as increased risk of post-op complications, such as stroke, thrombo-embolic and cardiac events all these resulting in the data previously mentioned.

The significance of the problem for Romania is reflected by the incidence, burden and treatment of OP, as well as by the estimated tendencies. For 2010, (Ivergard *et al.*, 2013; Svedbom *et al.*, 2013), almost one million people were diagnosed with OP, and new 94000 FFx were recorded, with an economic burden of €129 million and accounting for 29700 QALYs. Our country follows the increasing tendency for OP as the other EU countries, so a total number of new FFx of 110.000 is estimated for 2025, with a burden of €151 million for 2025. In order to illustrate the importance of OP as a public health problem for Romania, it must be underlined that, on the map of Fracture-risk for women, our country is in the “orange” zone, thus showing that prevention measures are still to be improved. (<https://www.iofbonehealth.org/facts-and-statistics/frax-map>).

Opposite to these concordant data for Romania and EU, a huge difference appear when analyzing the therapy (Ivergard *et al.*, 2013), as only 1.65% of persons at risk (age 50 yrs or above) are treated, thus generating a treatment gap of 83% in women, meaning the proportion of non-treated within the total number of women with fracture-risk. These data become worrying when comparing them with the treatment gaps of other countries, such as Spain (25%), Ireland (26%) Hungary (28%), Greece (31%) and Portugal (37%), thus demonstrating that consistent measures for limiting the phenomenon of OP are necessary.

Modern medicine fully described the pathogeny of OP, including the risk factors and the methods of early diagnosis and treatment, but in the absence of a national screening programme, all these require the active cooperation of the subjects, who must voluntarily apply for screening and treatment, if necessary. Like any willingly performed action, this depends on the level of information each persons have, especially those who are not at high risk yet, so the prophylactic methods can be successful and trust in the doctor patient relationship is very important. (Cojocar, Cace & Gavrilocici, 2013).

Purpose

The purpose of this paper is to evaluate the level of awareness regarding the risk factors of OP and the personal exposure to them in a group of not-at-risk subjects, so as to establish potential directions to stimulate a proper attitude towards prophylaxis. Knowledge assessment refers to: (1) Risk factors for OP; (2) Self-assessment of individual risk. Direction of actions refers to: (1) Identify incomplete knowledge- which of the risk factors are insufficiently known, how can they be addressed; (2) Potential efficacy of a national screening program, as it results from this research

Material and Method

The study group for this research consisted of 110 women admitted in the Orthopaedics and Trauma Clinic, Unit II, Clinical Emergency Hospital Bucharest, between 01.06.2015-01.01.2016; the inclusion criteria were: age under 50 yrs old or pre-menopause, no diagnosed osteoporosis, traumatic fracture, willing to complete the questionnaire. The patients older than 50 yrs old or younger, but with installed menopause, those with diagnosed osteoporosis and those who did not complete the questionnaire, due to several reasons, were excluded. Mean age of the patients was 40.5 yrs (21-50 yrs); 59% of them (65/110) came from urban environment. The structure of the study group is represented in *Table 1*.

Table 1. The structure of the study group

	Total	Urban	Rural	No baccalaureate	With baccalaureate	Licensed	Master
21-30 yrs	32	20	12	4	6	16	6
31-40 yrs	38	24	14	9	7	13	9
41-50 yrs	40	21	19	11	9	9	11
Total	110	65	45	24	22	28	26

The included patients were given a questionnaire with two parts: in the first part, the questions referred to the risk factors for OP, in the second part, they referred to the patient's perception about her OP-related status. Regarding the risk factors, as shown in *Table 3*, there were two types of questions: those which referred to elements which do have the recognized properties as risk factors for OP, and those which referred to circumstances for which have not been established correlations so that they should not be considered as risk factors (marked with italic letters). Each of the questions had 3 answers (yes/no/I don't know) and the patients were asked to provide the answers without consulting other persons or sources of information, explaining them that this was not a test, but a modality to help us and all the other people involved in health care; the patients were explained that the answers were, anonymous and they would be used solely for determining how knowledge regarding OP can be improved in different medical services. By

doing this, the patients didn't feel like they were having an exam and not only gave honest answers, but demonstrated interest for the problem, as 102 of them commented at the end that they would like to find out if their answers were correct, meaning that they were willing to improve their knowledge.

Results

The patients answers were counted into: correct, incorrect and, "I don't know". The correct answers represented 67.81%, the incorrect 22.7% and "I don't know" 9.4 %, calculated as: $\text{total correct answers (\%)} = 100 \times \frac{\text{total correct answers (abs. value)}}{(110 \times 25)}$; 110= total number of patients, and 25= number of questions in the questionnaire. It is to be underlined that a total of 32.1% did not indicate for sure the proper risk factors, meaning that 1 patient of three could neglect certain aspects of the problem. Osteoporosis represent a deterioration of bone tissue, which becomes more porous, with decreased mineral density, thus decreased resistance, resulting in increased risk of fractures (with their complications).

Table 2. The questionnaire and the quality of the answers (correct/incorrect/I don't know)

The following circumstances represent risk factors for osteoporosis or osteoporotic fractures?	Correct	Incorrect	Don't know
Women after 50 yrs	66	36	8
Menopause	106	4	0
Relatives (especially mother) with osteoporosis/osteoporotic fractures	22	56	32
Inactive life style (including sedentary)	70	34	6
Thin shape	44	32	24
Food allergies during childhood	38	48	24
Smoking	86	20	4
Excessive meat intake	86	12	12
Excessive coffee intake	64	10	16
Daily excessive alcohol intake	82	20	8
Fat diet	84	20	6
Reduced water intake	88	2	20
Low intake of milk and milk-derivates	110	0	0
Hyperthyroidism	80	17	13
Intestinal disorders	20	75	15
Repeated episodes of acute respiratory infections	88	8	14
Rheumatoid arthritis and other inflammatory rheumatologic diseases	71	26	13
Cortisone and its derivates	92	8	10
Have you ever discussed with any medical personnel about osteoporosis?	88	32	
Have you ever informed from the internet about osteoporosis?	96	14	
Have you considered yourself at risk for osteoporosis?	36	80	4
Do you agree that osteoporosis can produce severe back pain and deformations?	90	8	
Would you like to discuss with medical staff regarding osteoporosis prevention?	106	4	
Would you like to know your risk of having an osteoporotic fracture?	94	16	
Would you follow recommendations regarding osteoporosis prevention?	68	2	30

As it can be seen, the questionnaire contains two types of questions: the first 18 questions refer specifically to real (13) or *false (5) (identified with italic letters)* risk factors, while the last 7 refer to each patient's attitude towards her own status. In order to identify the weak points in knowledge about osteoporosis, the first 18 questions were ordered according to the frequencies of correct answers, thus obtaining the results form *Table 3*. The importance of intestinal disorders in occurrence of OP; only 18.18% of the subjects were properly informed, while 68.18% were convinced that there was no connection between the two circumstances, and 13.6% answered "I don't know", proving that they made no connection between the dysfunction of the bowels and the onset of osteoporosis; since this is related to the decreased absorption of the calcium in intestinal disorders producing osteoporosis, that means that 1/5 of the patients could not establish a logical connection proving that they were not aware about how the bone works, demonstrating a lack of basic anatomical information.

Table 3. Accuracy of the answers (decreasing order of percentages)

The following circumstances represent risk factors for osteoporosis or osteoporotic fractures?	Correct	Incorrect	Don't know
Low intake of milk and milk-derivates	100.0	0	0
Menopause	96.36	3.63	0
Cortisone and its derivates	83.63	7.27	9.09
Reduced water intake	80.00	1.81	18.18
Repeated episodes of acute respiratory infections	80.00	7.27	12.7
Smoking	78.18	18.18	3.63
Excessive meat intake	78.18	10.90	10.90
Fat diet	76.36	18.18	5.45
Daily excessive alcohol intake	74.54	18.18	7.27
Hyperthyroidism	72.72	15.45	11.81
Rheumatoid arthritis and other inflammatory rheumatologic diseases	64.54	23.63	11.8
Inactive life style (including sedentary)	63.63	30.90	5.45
Women after 50 yrs	60.00	32.72	7.27
Excessive coffee intake	58.18	18.18	23.63
Thin shape	40.00	29.09	21.81
Food allergies during childhood	34.54	43.63	21.81
Relatives (especially mother) with osteoporosis/osteoporotic fractures	20.00	50.90	29.09
Intestinal disorders	18.18	68.18	13.63
Have you ever discussed with any medical personnel about osteoporosis?	80	20	
Have you ever informed from the internet about osteoporosis?	87.27	12.72	
Have you considered yourself at risk for osteoporosis?	32.72	72.72	3.6
Do you agree that osteoporosis can produce severe back pain and deformations?	81.81	7.2	109
Would you like to discuss with medical staff regarding osteoporosis prevention?	96.36	3.64	
Would you like to know your risk of having an osteoporotic fracture?	85.45	14.54	
Would you follow recommendations regarding osteoporosis prevention?	61.81	10.9	27.27

The hereditary aspects of OP; only 20% of the subjects knew that osteoporotic fracture in a woman represents a risk factor for her daughter to develop OP; this aspect reveals a strong negative point; more than that, 29 % of the subjects answered “I don’t know” and 51% of the subjects had a false idea, denying any connection between the risk of OP and hereditary circumstances, thus a total of 80% of the study group had a wrong perception considering this issue. From the total number of answers, 9.4% were “I don’t know”, reflecting that the subjects had minimum or no information about these aspects; besides the problem of the parental – associated risk of OP (presented above), the lack of information about shape (50.9% answered incorrect or “don’t know”) needs to be addressed, especially that obesity is thoroughly addressed to do its involvement in multiple comorbidities. Three false negative connections (the one regarding food allergies during childhood, the one about fat diet and excessive meat intake) were not definitely rejected by the participants, thus proving that more attention has to be paid to defining the role of food in preventing OP. On the opposite site, all the subjects provided the proper answers regarding the importance of milk and milk derivatives in preventing OP, thus being practically the only risk factor unanimously recognized and evaluated according to its importance.

Regarding the onset of osteoporosis, although 96.36% of the subjects related OP with menopause, only 60% were aware that the critical age for the risk of OP is 50 yrs old, while 32.7% disagreed with this. This is usually related to the fact that OP is considered to affect “old people” and demonstrates that this problem needs to be clarified. An aspect to be tackled is the fact that 30.9% of the subjects thought that there is no connection between inactive life style and the onset of osteoporosis; while 41.8% were not aware that excessive coffee intake is a risk factor for osteoporosis; almost the same percentage represented the subjects who had incorrect knowledge about inflammatory disorders, and a lesser percent (21.8%) had the same attitude towards smoking; these proportions are surprising since rheumatologic diseases do not represent a pathology with a considerable incidence, still the subjects of the study group had almost the same proportion of proper answers for them as for the coffee intake. As shown in *Table 2*, 83.6% of the responders were aware about the connection between cortisone drugs and osteoporosis, the percentage being even higher than those related to smoking or alcohol intake; these data might suggest that the interest for medication is inappropriately higher comparative to the one for the life style.

Regarding the last 7 questions, it is to be underlined that internet was a source of information more frequently used comparative to the medical personnel, but 96.3% of the participants expressed their wish to discuss the problem of OP with health care professionals. Still, besides the fact that only 85% of them would like to know their fracture risk, the answer to the last question shows that only 61.83% would be compliant to the medical recommendations regarding OP (0.9% would definitely not follow them and 27.27% were not sure about it) thus reflecting a

possible cause of the reduced percentage of the people treated for OP in our country.

Discussions

Due to the dimension of OP as a global health care issue, proper knowledge about risk factors is tremendous, because there is a high possibility to diminish their impact for most of them. Although there is no study to quantify the efficacy of OP prophylaxis, indirect measurements can indicate this: so, if an increased incidence of the people-at-risk treated correlated with a reduced incidence of OP complications, this indicates the efficacy of the prophylactic measures; according to the data published by the European Panel of the IOF (Svedbom *et al.*, 2013; Helmlund *et al.*, 2013), a good example is Spain, where the treatment gap (previously defined) is only 25% and the incidence of hip fractures OP related is 313/100.000 women above 50 yrs, compared to a treatment gap of 44% in Slovenia, with 559 fractures/100.000 women and a treatment gap of 49% in Slovakia, with 572 fractures/100.000 women.

The insufficiency of prevention measures in our country is also reflected by the fact that in most cases, it is the complication (especially a hip fracture) which leads to the diagnosis of OP. A multicentric study (Mihalache *et al.*, 2013) revealed that 82.1% of the patients with hip fractures did not have a diagnosis of OP at the time of fracture, and although the etiology of these fractures was clear, 21.3% of patients had no documentation regarding treatment prescription for OP at discharge, thus proving that corrective measures must be taken into this direction. Considering the risk factors for OP, they are related mainly to: age, familiar medical history, personal habits, medical condition and medications. Considering the results of our study, for each of these categories are to be discussed: (1) Actual issues to be solved and (2) Potential directions of intervention to solve these issues.

Age - age over 50 yrs and menopause are considered risk factors for OP (Ferrari *et al.*, 2012; Cooper *et al.*, 2012b), but, despite most of the subjects were aware about the menopause, only 60% considered the age of 50 yrs old as a risk factor, maybe because OP is associated with “old people”, disregarding the fact that 50 yrs old is the age of menopause onset; it is difficult to presume the reason, but efforts must be done to: (1) contradict the idea that OP means “old people”; (2) make the women aware that after 50 yrs old they should consider themselves definitely at risk.

Familiar medical history- the reduced proportion of the women aware that medical history of OP fractures increases the risk of OP for future generations (Kanis *et al.*, 2012; 2013b) has to be solved but without transforming OP into a genetic disease; young women, long before menopause must be interested in their

mothers and grandmothers medical history of OP fractures, while mothers knowing that their family has members with OP fractures must educate their daughters to take care about minimising other risk factors, since they already have one. Personal habits: smoke, obesity, inactive life style, increased coffee and alcohol intake represent risk factors for OP (Kanis *et al.*, 2013a; Kanis, 2014), but also for many other diseases. Still the awareness regarding their implication in OP was not expected in our study group; a possible explanation is that most of them are main risk factors for other diseases: smoke for lung cancer, alcohol intake for liver diseases, sedentary for heart diseases, etc; since OP seems to have less immediate mortality, the connections of these health-affecting causes with OP seems to be underestimated; more than that, the number of the subjects answering “I don’t know” is less than those who were sure that there was no connection, thus creating the assumption that the responders might even continue to embrace these habits because they did not consider them relevant for OP

Medical conditions and medication can represent risk factors for OP (Kanis *et al.*, 2013b; Lekamwasam *et al.*, 2012); although a high number of responders were aware about the cortisone as a risk factor for OP, insufficient knowledge about rheumatologic diseases and bowel diseases were proven by our study; still, this aspect is not as important at the level of the global social intervention, since this aspect is particularly interesting for people having these diseases; still, it can’t be said that this is totally unimportant for the general population, since increasing the general awareness can protect the people affected by these conditions, who can be informed by contacts who have this knowledge.

Considering these aspects, as well as the increasing incidence of OP and OP fractures in our country require a coordinated social intervention: possible levels of intervention for increasing the awareness about the risk factor of OP can be: (1) School- even at the elementary level, the importance of diet (especially milk and milk-derivates intake and proper diet for avoiding obesity), as well as that of physical activity can be approached with maximal effect, since children are much more permeable to information than adults; given the fact that the age of smokers became worryingly lower, basic ideas focused on non-smoking should be included; (2) High school can enhance the previous load and complete with information regarding negative effects of smoking and alcohol consumption; due to the fact that puberty means a dramatic physical change, this period is crucial for developing the active-life style based on conscious adherence to it, not by imposed measures; (3) Superior education, when exists, unless it refers to medicine, has a less important contribution, only through physical education hours, reduced by number and importance. Although smoking is forbidden in public institutions, it is doubtful that this measure diminishes the number of smoking during youngsters. It might be discussed whether subjects referring basic health care and ergonomy should be approached at least as optional, because during this period, internet is the main informational source; more than that, a subject like OP should be

carefully addressed, as it is considered a disease of the old people, and students think that they are too far from this problem to be interested about it. The idea that OP can also appear in young persons, in pathological situations or even in physiological ones (like pregnancy, for example), but mainly the concept of preparing the future health starting from youth should guide the education regarding OP for this category.

Health care services, especially through the primary assistance system, should have the main role in making the people aware about the risk factors for OP and, thus, about their individual risk. Unfortunately, two aspects impair the proper fulfilment of this objective:

Firstly, the high amount of beaurocratic work loading the family doctors sometimes prevents them from playing their supposed educational role. As reported by the Romanian Minister of Health in 2012 (<http://www.ms.ro/pag=45-&id=3251>), family doctors are overload with papers and other administrative non-medical activities, so that the time for the real medical evaluation is considerably diminished.

Secondly, as confirmed by our study, there is a significant proportion of people who are not willing to respect the medical recommendations; the reasons can be more: they do not want to change their health-threatening habits (such as smoke or alcohol consumption) or, due to the constant media campaign of presenting only negative aspects of the medical system, they do not trust the medical personnel. The result of this policy of undermining the medical staff is the fact that prevention measures become useless, thus increasing the risks for the general population, and the costs, as well. The phenomenon was recently exposed by the disturbances in the vaccination campaigns, which appeared due to the fact that media, instead of consulting medical literature and specialists, advertised the opinion of some non-medical persons with public impact; the result was the appearance of severe cases which can be correlated with cease of vaccination.

Unfortunately, although the social costs are tremendous, our society does not interfere with such situations, demonstrating that the authorities who should have regulatory activities, are ineffective, let alone that the material resources are wasted on cases which could have definitely been prevented. It is therefore necessary to organise proper advertising campaigns, with clear, evidence-based message, as well as to support activities promoting OP prevention, regardless of their level of competence, but with proper medical endorsement, avoiding the confusing or even incorrect ideas.

Conclusion

The actual situation in Romania demonstrates a low treatment rate and increased OP fracture risk. As the incidence of OP is estimated to increase, mortality and morbidity due to complications of OP are expected to increase the burden of OP, thus enhancing the necessity of proper prevention. This paper demonstrates that awareness regarding the risk factor for OP in pre-menopausal women is not consistent enough for to developing an individual attitude able to protect them for the action of the risk factors, thus exposing society to an increased risk of morbidity and mortality and to enhanced costs, as well. It is therefore necessary a multiple-level intervention of the society, characterised by continuity from one-level to another and focused on medically correct information, so that a proper education in the field of OP prevention to be fulfilled.

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