

Osteometabolic disease: Aspects of importance to the population

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Abstract

The school is an appropriate environment for the development of actions in health and education to promote the prevention of bone metabolic diseases. Students of the University of Sao Paulo (USP) organized lectures and informative activities about this issue for high school students aiming to encourage preventive postures. At the end of these classes a positive reception and approval in relation to these activities were done by the students and teachers. These people participated through the recitation asking and answering questions about different experiences through dialogue. Thus, the involvement in the Culture and Extension program provide a narrowing between the academic community and the public. This project helps to

structure disseminative informative agents and aware about the reality and current problems, aiming positive attitudes related to prevention of future problems that may affect the quality of life.

Keywords: Metabolic bone disease. Prevention and health. Extension program.

Introduction

The osteometabolic diseases are a group of bone metabolism disorders characterized by loss of bone mass and breakdown of its microarchitecture, bringing the fragility of this tissue and consequently the increase of fractures incidence (CARVALHO; FONSECA; PEDROSA, 2004; FRAZÃO; NAVEIRA, 2006; MONTAGNANI, 2014). The main diseases belonging to this group are osteoporosis, osteomalacia, hyperparathyroidism, rickets and Paget's disease. Among these, osteoporosis is the main and most frequent, especially affecting the elderly, being primarily responsible for the occurrence of fractures, leading to severe disability and discomfort to the affected people (FRAZÃO; NAVEIRA, 2006; YAZBEK; MARQUES NETO, 2008). The disease is considered a public health problem by reaching approximately 35-52% of women and 19-39% of men over fifty years of age in the population, and these diseases are responsible for disability on elderly, by causing fractures that are difficult to cure, with serious implications on the quality of life (CARVALHO; FONSECA; PEDROSA, 2004; PINHEIRO et al., 2010).

All these changes present several predisposing factors such as: Old age, low bone mass, heredity, treatment with corticosteroids, low-calcium diet, sedentary lifestyle, smoking and alcoholism (CARVALHO; FONSECA; PEDROSA, 2004; MARTINI et al., 2009; SOUZA, 2010). And already know that the healthier lifestyle can improve or prevent the onset of these diseases, this is not widely known in entire population, especially the young people, that are encouraged by great changes, they become more vulnerable to behavior that may harm your health (CARVALHO; FONSECA; PEDROSA, 2004; NUNES; SILVA, 2011; VIEIRA et al., 2008). In literature, bone remodeling is characterized by the initial presence of osteoclasts to bone resorption, followed by osteoblasts for the creation of new bone formation, decompensation that bone physiological balance can lead to diseases such as osteoporosis, and this disorder is currently the subject of several studies to develop drugs (RACHNER; KHOSLA; HOFBAUER, 2011). In several studies, biopsy of

human bones are used for analysis of the presence of osteoporosis, but with several controversies, with some studies in favor of the biopsy (ARNALA, 1991; ERIKSEN et al., 1990) and others against this approach in patients (DE VERNEJOU et al., 1987). But it is necessary scientific knowledge to know if a patient has or not been affected by this disorder, which were found higher bone resorption compared to the formation (ERIKSEN et al., 1990). To assess bone metabolic disorders, our research group presents works, which animal models were used for assessment of bone structure in terms of bone metabolic changes.

Seeking to inform the public about the health-related problems, the university extension projects develop an important role regarding the integration of the academic community to the population, seeking to address strategies that help to build knowledge together using the knowledge of the causative agent with the external community of campus. It is a two-way street in which the university takes knowledge and/or assistance to the population and it receives positive inflows in the form of feedback, such as their real needs, desires and aspirations (NUNES; SILVA, 2011).

Applying health actions with the primary objective of prevention of bone metabolic diseases, students of the University of Sao Paulo (USP) were involved in this project, organized to promote, on public high school, lectures and informational activities that addressed aspects of health promotion and prevention relevant to these diseases, guiding young people for recognition and targeting therapy for cases involving these changes.

Materials and methods

Five high schools (state and municipal) in the city of Ribeirao Preto were selected, however due, pre-organized activities of these students, it was possible only to visit the State School Dom Luiz do Amaral Mousinho. It was chosen students of first to third grade with an average age of 15 years old. It was made available to students with classical literature on the basic knowledge and pathological conditions affecting bone metabolism. Seeking further complement, a presentation was done about histological micrographies developed by Dentistry School of Ribeirao Preto (University of Sao Paulo) and Faculty of Medicine of Ribeirao Preto (University of Sao Paulo), stained with Masson trichrome, aiming to expose microarchitectural

changes on bone structure, in experimental animals subjected to conditions of change in bone metabolic balance. In this way, an introduction was made regarding the bone tissue biology (Figure 1), demonstrating the cell types and the importance of a newly formed bone, differences between trabecular and cortical bone, in addition to clarify, using these histological sections, the involvement of bone tissue by osteoporosis.

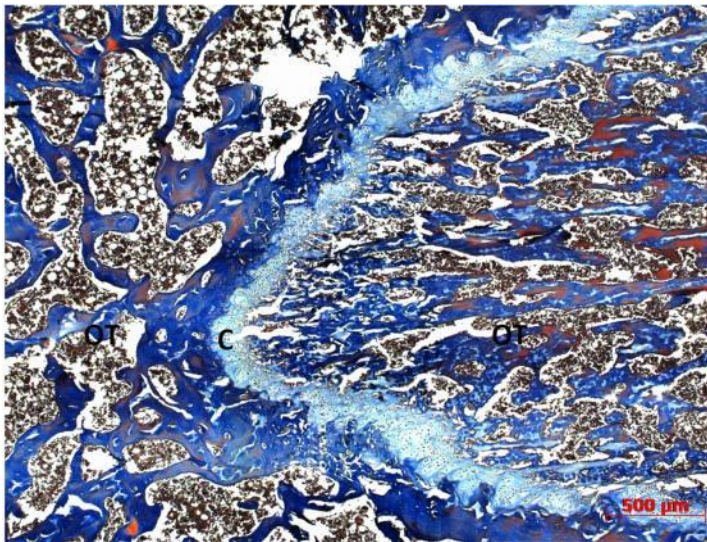


Figure 1. Histological photomicrograph of long bone stained by Trichrome of Masson, showing the hyaline cartilage (C) bounded by the red line and OT (trabecular bone) present in the femur bone of healthy Wistar rats. Magnification of 5x.

Thus, the lectures and the guidelines provided to the population aiming to promotion of health, prevention of these diseases, bringing benefits to the population, providing greater access to information, the adoption of preventive posture, minimizing and delaying the appearance of bone metabolic diseases, as well as greater interaction among undergraduate students to the public in understanding the social role. To Learn Program with Extension and Culture, involving the theme was used to the slide show, in the form of a theoretical lecture with a dialogue in the form of "chat" at the end to clarify questions.

Results

The project reached 48 students of the municipal school Dom Luiz do Amaral Mousinho EMEFEM. Four schools did not participate in the program because the school schedule was redesigned, which hampered the availability of time, making it impossible to reach more students and schools.

Participants were students from the last year of high school and attended the lectures that took place in schools, taught by graduate students. At the end of class, have been observed a positive response compared to what was proposed by the students and school teachers who participated throughout the lesson by asking questions and answering questions. This exchange of experiences through dialogue allowed greater involvement between the university and the community. Some students collaborated still reporting the personal family experiences or close friends who have any of the foregoing diseases, enriching the discussion with experienced and experienced real issues, bringing the reality and enriching students' knowledge on the importance of scientific approaches with the use of tools of light microscopy. The students' interest was further piqued with the presentation of histological figures which demonstrated the cell types of bone tissue (Figure 2), and histological sections emphasizing the importance and differences between cortical and trabecular bone (Figure 3).

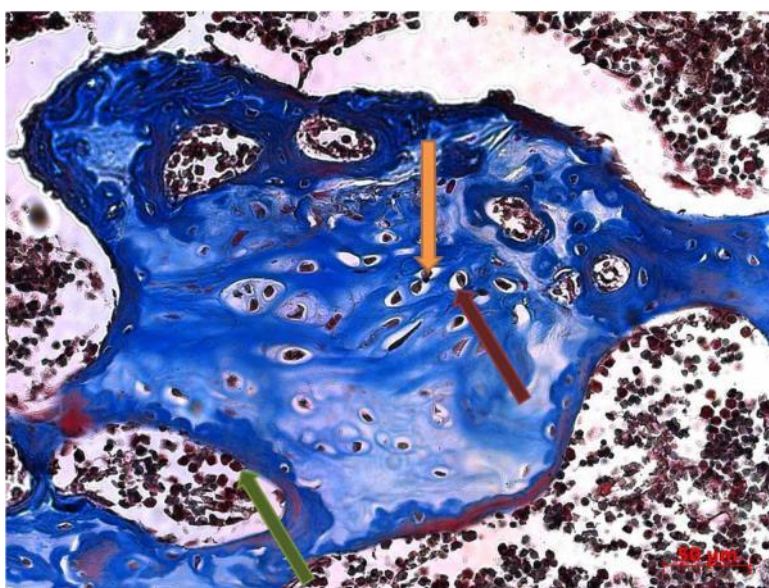


Figure 2. Photomicrograph of a histological section of long bone stained by Masson's trichrome, showing an osteoblast in green arrow, osteocyte lacunae in red arrow, osteocyte cell in orange arrow. magnification 40x.

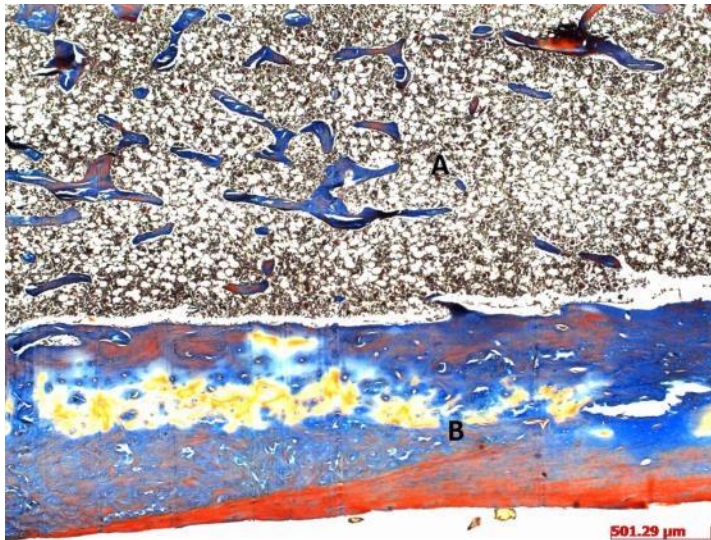


Figure 3. Photomicrograph of long bone stained by Trichrome of Masson showing the trabecular portion A and the cortical portion B. Magnification 10x.

It was observed that all the discussed topics, which aroused most interest was osteoporosis, precisely because it is the osteometabolic disease with the highest incidence, especially among women of full age. The aspect that most caught the attention of students and generated many questions was when it showed the change in trabecular content from histological images with better trabeculae distributed in normal bone (Figure 4) and more widely spaced trabeculae in established osteoporosis bone (Figure 5), thus demonstrating the absence and presence of osteometabolic disturbances, respectively. This interaction between clinical subjects taken by undergraduates and exposed to high school students are extremely important for the acquisition of knowledge and prevention of emergence of these diseases affecting the elderly since adolescence making, with this knowledge acquired, students paid attention to this issue and should seek healthy habits for life for not to become victims of this problem and also serve as backers of information acquired to share this with the population by what was presented.

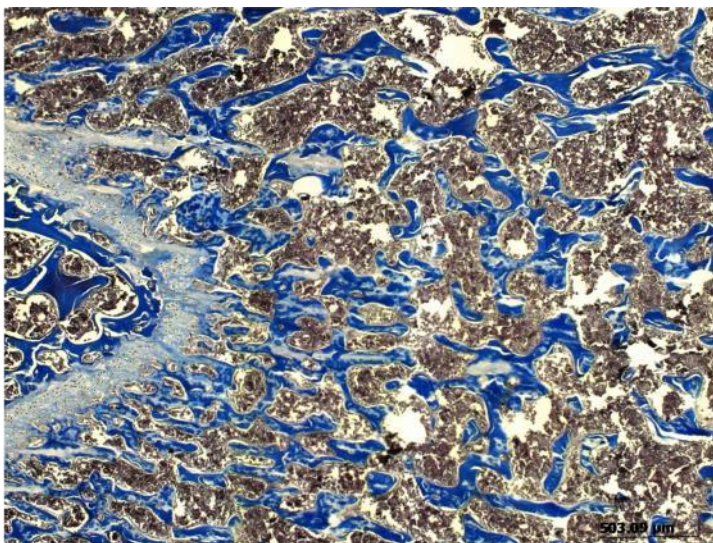


Figure 4. Histological photomicrograph stained by Trichrome of Masson demonstrating the structured trabecular bone and better bone quality. Therefore, in this photomicrograph there is a bone without osteometabolic illness.

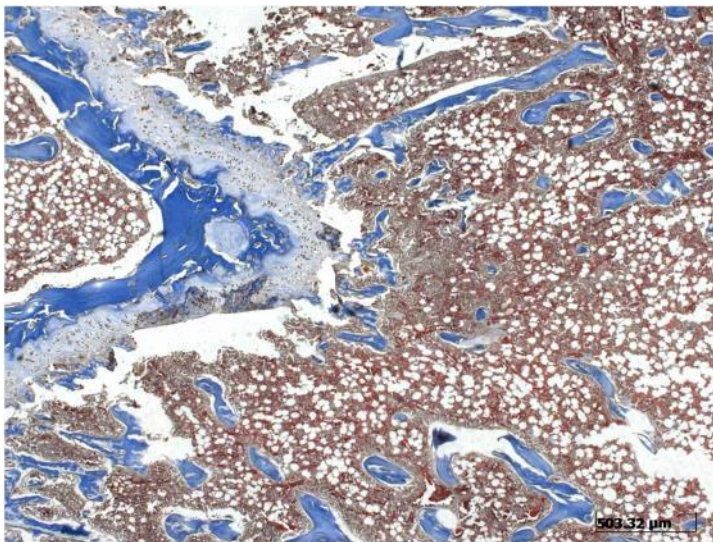


Figure 5. Histological photomicrograph stained by Trichrome of Masson with established osteoporosis showing the small amount of trabecular bone and bone structure in poor condition.

Discussion

The school was very suitable environment for the development of actions in health education and has the educational mission to complement the family formation, contributing to learning, building personal values and social values providing mastery of basic cultural content, reading, writing, the arts and sciences,

among which the health education is on it. Therefore, the development of activities related to the orientation of the school enables the promotion of preventive self-care attitudes generating the understanding that health is also a duty and personal responsibility (FREITAS, 2011).

These actions and projects aimed at health promotion stimulate the interaction between the university and the community and are an important element to the undergraduate student learning, which in contact with the people acquire skills and knowledge about reality, making it subject transformer learning, able to build and produce knowledge (CARVALHO; FONSECA; PEDROSA, 2004).

Considering the absolute and relative increase in the elderly population and unhealthy habits of infants and adolescents, there is an increased incidence of bone metabolic diseases, especially osteoporosis and its risk factors. In this regard, the adoption of preventive measures for bone metabolic diseases is necessary because these diseases are associated with pain symptoms, limited mobility and poor quality of life, increasing by 20-25% the risk of death in the year following fracture (CARVALHO; FONSECA; PEDROSA, 2004; NUNES; SILVA, 2011; YAZBEK; MARQUES NETO, 2008).

Among the osteometabolic diseases, osteoporosis is the most prevalent and commonly associated with old age (RIGGS; MELTON, 1986), and can also affect young and old, so depending on the diet and how the young behaves for managing your "savings" for bone health (MALINA; BOUCHARD; BAR-OR, 2004). Thus, it is important to start early prevention of these diseases through the development of actions aimed at informing the population about health-related issues (SILVA; COTTA; ROSA, 2013).

Torquato et al. (2012) found that although most people have heard about the disease, many are unaware of the aspects related to the prevention of such risk factors. Thus, promoting projects that reach the population and address the health preventive methods are important tool to encourage healthy habits providing the value of health, discernment and participation in decisions concerning the individual and collective health. Requiring that these methods are continuing, which favor prevention, minimization of risks and the protection of vulnerability, seeking the production of self-health care.

Promoting health issues such as nutrition, diagnosis, heredity, sedentary lifestyle, smoking, alcohol intake, menopausal among other problems related to bone

metabolic changes were discussed during the talks. Seeking to convey as much information, undergraduates talked to students in simple language. This approach of the students with the population awakens an affinity of students to social issues, which are often neglected by the University, which together with the population, need to create and understand the transformative capacity of the knowledge produced by the ratio of these two means, and look fortify it through the construction of educational and communicative projects, which essentially opens the doors of universities to the community as a whole (NUNES; SILVA, 2011; SILVA; COTTA; ROSA, 2013).

Conclusion

The experience, knowledge and involvement obtained in the Learning, Culture and Extension program, provided a narrowing between the academic community and the public, helping to train disseminators agents that become more informed beings and aware of reality and everyday problems. In this sense we will be able to train citizens who have a proactive approach to promoting the prevention of future problems that may affect the quality of life of society. We understand that this articulation between university and society is extremely desirable and beneficial, particularly for its replication character and dissemination of knowledge.

References

ARNALA, I. Use of histological methods in studies of osteoporosis. *Calcified Tissue International*, v. 49, n. 1, p. S31-S32, 1991. Supplement 1. Available in: <<http://link.springer.com/article/10.1007/BF02555085>>. Accessed on: 17 July 2016.

CARVALHO, C. M. R. G.; FONSECA, C. C. C.; PEDROSA, J. I. Educação para a saúde em osteoporose com idosos de um programa universitário: repercussões. *Cadernos de Saúde Pública*, Rio de Janeiro, v. 20, n. 3, p. 719-726, 2004. Available in: <<http://www.scielo.br/pdf/csp/v20n3/08.pdf>>. Accessed on: 17 July 2016.

DE VERNEJOU, M. C. et al. Bone histological heterogeneity in postmenopausal osteoporosis: a sequential histomorphometric study. *Bone*, v. 8, n. 6, p. 339-342, 1987. Available in: <<http://www.ncbi.nlm.nih.gov/pubmed/3449108>>. Accessed on: 17 July 2016.

ERIKSEN, E. F. et al. Cancellous bone remodeling in type I (postmenopausal) osteoporosis: quantitative assessment of rates of formation, resorption, and bone

loss at tissue and cellular levels. *Journal of Bone and Mineral Research*, v. 5, n. 4, p. 311-319, 1990. Available in: <<http://www.ncbi.nlm.nih.gov/pubmed/2343771>>. Accessed on: 17 July 2016.

FRAZÃO, P.; NAVEIRA, M. Prevalência de osteoporose: uma revisão crítica. *Revista Brasileira de Epidemiologia*, Sao Paulo, v. 9, n.2, p. 206-214, 2006. Available in: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1415-790X2006000200007>. Accessed on: 17 July 2016.

FREITAS, I. C. Função Social da Escola e a Formação do Cidadão. *Democracia na escola*, 2011. Available in: <<http://democracianaescola.blogspot.com.br/2011/10/cabe-escola-formar-cidadaos-criticos.html>>. Accessed on: 17 July 2016.

MALINA, R. M.; BOUCHARD, C.; BAR-OR, O. *Growth, Maturation, and Physical Activity*. 2 ed. Champaign: Human Kinetics, 2004. 728 p.

MARTINI, L. A. et al. Prevalência de diagnóstico auto-referido de osteoporose, Brasil, 2006. *Revista de Saúde Pública*, Sao Paulo, v. 43, p. 107-116, 2009. Supplement 2. Available in: <http://www.scielo.br/scielo.php?pid=S0034-89102009000900014&script=sci_abstract&tlng=pt>. Accessed on: 17 July 2016.

MONTAGNANI, A. Bone anabolics in osteoporosis: Actuality and perspectives. *World Journal Orthopedics*, v. 5, n. 3, p. 247-254, 2014. Available in: <<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4095017/>>. Accessed on: 17 July 2016.

NUNES, A. L. P. F, SILVA, M. B. C. A extensão universitária no ensino superior e a sociedade. *Mal-Estar e Sociedade*, Barbacena, v. 4, n. 7, 2011. Available in: <<http://www.uemg.br/openjournal/index.php/malestar/article/view/60>>. Accessed on: 17 July 2016.

PINHEIRO, M. M. et al. O impacto da osteoporose no Brasil: dados regionais das fraturas em homens e mulheres adultos - The Brazilian Osteoporosis Study (BRAZOS). *Revista Brasileira de Reumatologia*, Sao Paulo, v. 50, n. 2, p. 113-127, 2010. Available in: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0482-50042010000200002>. Accessed on: 17 July 2016.

RACHNER, T. D.; KHOSLA, S.; HOFBAUER, L.C. Osteoporosis: now and the future. *Lancet*, London, v. 377, n. 9773, p. 1276-1287, 2011. Available in: <<http://www.ncbi.nlm.nih.gov/pubmed/21450337>>. Accessed on: 17 July 2016.

RIGGS, B. L.; MELTON, L. J. 3rd. Involutional osteoporosis. *The New England Journal of Medicine*, v. 314, n. 26, p. 1676-1686, 1986. Available in: <<http://www.ncbi.nlm.nih.gov/pubmed/3520321>>. Accessed on: 17 July 2016.

SILVA, L. S.; COTTA, R. M. M.; ROSA, C. O. B. Estratégias de promoção da saúde e prevenção primária para enfrentamento das doenças crônicas: revisão sistemática. *Revista Panamericana de Salud Pública*, Washington, v. 34, n. 5, p. 343-350, 2013.

Lucas O. Monteiro, Eduardo B. Ribeiro, Vinícius Pedrazzi, Miliane G. Gonzaga, Fellipe Augusto T. de Figueiredo, Sara Feldman, João Paulo M. Issa

Available in: <<http://www.scielo.org/pdf/rpsp/v34n5/a07v34n5.pdf>>. Accessed on: 17 July 2016.

SOUZA, M. P. G. Diagnóstico e tratamento da osteoporose. *Revista Brasileira de Ortopedia*, Sao Paulo, v. 45, n. 3, p. 220-229, 2010. Available in: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-36162010000300002>. Accessed on: 17 July 2016.

TORQUATO, I. M. B. et al. Osteoporose: conhecimento e identificação de fatores de risco em idosos. *Revista de Ciências da Saúde Nova Esperança*, João Pessoa, v.10, n. 2, p. 5-21, 2012. Available in: <<http://www.facene.com.br/wp-content/uploads/2010/11/Revista-2012-N.2-COMPLETA.pdf>>. Accessed on: 17 July 2016.

VIEIRA, P. C. et al. Uso de álcool, tabaco e outras drogas por adolescentes escolares em município do Sul do Brasil. *Cadernos de Saúde Pública*, Rio de Janeiro, v. 24, n. 11, p. 2487-2498, 2008. Available in: <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2008001100004>. Accessed on: 17 July 2016.

YAZBEK, M. A.; MARQUES NETO, J. F. Osteoporose e outras doenças osteometabólicas no idoso. *Einstein*, Sao Paulo, v. 6, p. S74-S78, 2008. Supplement 1. Available in: <<http://apps.einstein.br/revista/arquivos/PDF/749-Einstein%20Suplemento%20v6n1%20pS74-78.pdf>>. Accessed on: 17 July 2016.