IOF Regionals
4th Asia-Pacific Osteoporosis Meeting
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Hong Kong

P302
The Effects of Combined Particulate Matter 10 Coal Dust Exposure and High-Cholesterol Diet on Femur Mineral Elements in Rats

Bambang Setiawan, Zairin Noor, Nia Kania, Nicolaas C. Budhiparama
Aims: This study was aimed to evaluate the changes of tibia mineral element and mesostructure at different time course of ovariecctomized rats.

Methods: A total of 30 Wistar female rats, were randomly divided into three groups including one control group and two groups for ovariecctomized rats (evaluated at one and two months after ovariecctomized procedure). Tibia bone mineral element was analyzed using X-ray fluorescence (XRF). Tibia mesostructure was assayed using scanning electron microscope (SEM). XRF and SEM was done in Central and Physics Laboratory, Malang State of University, Malang, East Java, Indonesia. ANOVA test was used to analyze the different level of tibia mineral element. This study was approved by Local Ethics Committee, Medical Faculty, University of Lambung Mangkurat, Banjarmasin.

Results: Mesostructure of control rats presented rod-like trabeculae with honeycomb appearance and minimal hole. Disregular integrity of trabecula and reduction of trabecular integrity, increasing porosity were found at all ovariecctomized groups. The levels of phosphorus, iron, and calcium/phosphorus were significantly higher in ovariecctomized rats compared to control group ($P<0.05$). The levels of nickel and copper were significantly lower in 1 month after ovariecctomized group compared to control group ($P<0.05$).

Conclusions: The present study reported that ovariecctomized changes mesostructure and phosphorus, calcium, zinc, nickel, copper, iron, calcium/phosphorus of rats's tibia.

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**THE EFFECTS OF COMBINED PARTICULATE MATTER 10 COAL DUST EXPOSURE AND HIGH-CHOLESTEROL DIET ON FEMUR MINERAL ELEMENTS IN RATS**

B. Setiawan 1, 2, Z. Noor 2, N. Kania 3, N. C. Budhiparama 4

1Medical Chemistry and Biochemistry, Faculty of Medicine, 2Orthopaedic and Traumatology, 3Pathology, Ulin General Hospital, Faculty of Medicine, 4Lambung Mangkurat University, Banjarmasin, 5Budhiparama Institute of Hip and Knee Research and Education Foundation for Arthroplasty, Sports Medicine and Osteoporosis, Jakarta, Indonesia

Aims: This study aimed to investigate the effect of combined particulate matter 10 (PM10) coal dust exposure and high-cholesterol diet on bone mineral elements in rats.

Methods: Thirty male Wistar rats were randomly divided into five groups. Rats were fed a normal diet (nonexposure group), or a high cholesterol diet concomitantly exposed to 12.5 mg/m$^3$ of PM10 coal dust an hour daily for 5, 6, 7 or 8 weeks. Rats were sacrificed at the end of experiment, and then femur was collected. Bone mineral elements was analyzed using X-ray fluorescence in Central and Physics Laboratory, Malang State of University, Malang, East Java, Indonesia. ANOVA test was used to analyze the different level of tibia mineral elements. This study was approved by Local Ethics Committee, Medical Faculty, University of Lambung Mangkurat, Banjarmasin.

Results: Inorganic composition of coal dust were iron (29.3±0.1 %), silicon (29.0±0.2 %), calcium (12.00±0.07 %), aluminum (10.0±0.2 %), titanium (6.31±0.19 %), phosphorus (5.90±0.04 %), potassium (4.5±0.06 %), barium (1.00±0.09 %), and several inorganic minerals less than 1 % including europium (0.70±0.00 %), chromium (0.48±0.04 %), nickel (0.41±0.00 %), copper (0.34±0.02 %), zinc (0.22±0.03 %), vanadium (0.20±0.02 %), and manganese (0.15±0.09 %). X-ray diffraction showed 36.3 % of crystalline with 177 nm crystal size consisting of illite (potassium aluminum silicate hydroxide hydrate), viseite (calcium aluminum phosphate silicate hydroxide), and cronstedtite (iron silicate hydroxyte). Combined coal dust exposure and high-cholesterol diet significantly increased phosphorus and calcium level relative to the nonexposure group ($P<0.05$). Combined coal dust exposure and high-cholesterol diet significantly decreased calcium/phosphorus ratio level than that the non-exposure group ($P<0.05$). The level of iron and zinc was significantly higher in 5 weeks group compared to non-exposure group ($P<0.05$). Significant increase of copper level in combined coal dust exposure and high-cholesterol diet group was detected when compared with the nonexposure group ($P<0.05$).

Conclusions: The present study showed that concomitant coal dust exposure and high-cholesterol diet changes femur calcium, phosphorus, and calcium/phosphorus ratio in rats.

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**MICROARCHITECTURAL CHANGES IN CANCELLOUS BONE DIFFER IN FEMALE AND MALE C57BL/6 MICE IN HIGH FAT DIET INDUCED OSTEOPOROSIS MODEL**

R. Trivedi 1, 2, J. Gautam 1, D. Choudhary 1, V. Khedgikar 1, P. Kushwaha 1, R.S. Singh 2, S. Tewari 2

1Endocrinology, Central Drug Research Institute, 2Department of Molecular Medicine and Biotechnology, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, India

Aims: The study shows relationship between fat and bone mass at distinct trabecular and cortical skeletal compartments in (high fat diet) HFD induced osteoporosis model.

Methods: C57BL/6 mice were assigned into four groups of eight animals each. Two groups, of male and female received standard chow diet while remaining two received HFD for 10 weeks. Daily food intake and weekly body weight was evaluated. Blood samples and tissue
THE EFFECTS OF COMBINED PARTICULATE MATTER 10 COAL DUST EXPOSURE AND HIGH-CHOLESTEROL DIET ON FEMUR MINERAL ELEMENTS IN RATS

Bambang Setiawan¹, Zairin Noor², Nia Kania³, Nicolaas C Budhiparama⁴

¹Research Center For Osteoporosis, Department of Medical Chemistry and Biochemistry, Faculty of Medicine, University of Lambung Mangkurat, Banjarmasin, South Kalimantan, Indonesia.
Email: ganesh79setiawan@gmail.com

²Research Center For Osteoporosis, Department of Orthopaedic and Traumatology, Ulin General Hospital, Faculty of Medicine, University of Lambung Mangkurat, Banjarmasin, South Kalimantan, Indonesia.
Email: noornoor@gmail.com

³Research Center For Osteoporosis, Department of Pathology, Ulin General Hospital, Faculty of Medicine, University of Lambung Mangkurat, Banjarmasin, South Kalimantan, Indonesia.
Email: kaniazairin@yahoo.com

Email: necbpr@indosat.net.id

BACKGROUND

- Elevation in serum lipid levels, namely hyperlipidaemia, can occur due to increased biosynthesis and/or decreased elimination of lipids [1].
- The inhalation of occupational and atmospheric coal dust has been reported to significantly contribute to the development of various respiratory and vascular disorders [2-4].
- Our previous studies showed that coal dust in single exposure or combination with another toxicant is able to change bone properties and metabolism [5-7].

OBJECTIVE

This study aimed to investigate the effect of combined particulate matter 10 (PM10) coal dust exposure and high-cholesterol diet on bone mineral elements in rats.

METHODS

25 Male Wistar rats, 170-200 gram, 3 months old

- Non-exposure
- High cholesterol diet (HCD)
- CO2 + HCD (5 weeks)
- CO2 + HCD (3 weeks)

The composition of normal diet was 65% standard Rat: 32% wheat powder, and 3% yeast.
The composition of HCD was 45% standard Rat: 56% wheat powder, 8% fish meal oil, 9% fish meal, 2% calcium carbonate, 2% sodium chloride, and 2.25% corn oil, according to previous study with modifications [5].

We put weighed coal dust in bottom hole (red arrow) of black pipe then the coal dust will circulated (white arrow) and entering the chamber again via upper hole yellow arrow. This air will inhale by rats in plastic chamber. To avoid discomfort, this chamber also supply by external oxygen and place in air conditioned room [7].

RESULT

- Combined coal dust exposure and high-cholesterol diet significantly increased phosphorus and calcium level relative to the non-exposure group (P < 0.05).
- Combined coal dust exposure and high-cholesterol diet significantly decreased calcium/phosphorus ratio level than that of the non-exposure group (P < 0.05).
- The level of iron and zinc was significantly higher in 5 weeks group compared to non-exposure group (P < 0.05).
- Significant increase of copper level in combined coal dust exposure and high-cholesterol diet group was detected when compared with the non-exposure group (P < 0.05).

CONCLUSION

- The present study showed that concomitant coal dust exposure and high-cholesterol diet changes femur calcium, phosphorus, and calcium/phosphorus ratio in rats.

REFERENCES


PRESENTED AT

IOF Regionsals
4th Asia-Pacific Osteoporosis Meeting
Hong Kong Convention and Exhibition Centre
December 12-15, 2013
CERTIFICATE OF POSTER PRESENTATION

We Cyrus Cooper, Tai Pang Ip, Timothy Kwok & Sue Lo certify that:

BAMBANG SETIAWAN

P302/ THE EFFECTS OF COMBINED PARTICULATE MATTER 10 COAL DUST EXPOSURE AND HIGH-CHOLESTEROL DIET ON FEMUR MINERAL ELEMENTS IN RATS

Has attended the IOF Regionals: 4th Asia-Pacific Osteoporosis Meeting, Hong Kong Convention and Exhibition Centre, Hong Kong, December 12-15, 2013.

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Co-chair
Scientific Committee

TAI PANG IP
Co-chair
Scientific Committee

TIMOTHY KWOK
Co-chair
LOC

SUE LO
Co-chair
LOC
CERTIFICATE OF ATTENDANCE

We Cyrus Cooper, Tai Pang Ip, Timothy Kwok & Sue Lo certify that:

Bambang SETIAWAN

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CYRUS COOPER  Co-chair
Scientific Committee

TAI PANG IP  Co-chair
Scientific Committee

TIMOTHY KWOK  Co-chair
LOC

SUE LO  Co-chair
LOC
CERTIFICATE OF ATTENDANCE

We Cyrus Cooper, Tai Pang Ip, Timothy Kwok & Sue Lo certify that:

Zairin NOOR

Has attended the IOF Regionals: 4th Asia-Pacific Osteoporosis Meeting, Hong Kong Convention and Exhibition Centre, Hong Kong, December 12-15, 2013.

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Subject: IOF Hong Kong - Abstract acceptance - Posterl

Instructions for Poster Presentation

Dear Mr Bambang SETIAWAN,

We are pleased to inform you that your abstract entitled "THE EFFECTS OF COMBINED PARTICULATE MATTER 10 COAL DUST EXPOSURE AND HIGH-CHOLESTEROL DIET ON FEMUR MINERAL ELEMENTS IN RATS", previously referenced as IOFHK13-1284, has been accepted for a poster presentation. Please note that your Abstract has been re-numbered and your final number is: P302. This final ID is to be used for your presentation as well as for any further correspondence.

In order for you to answer questions from the poster viewers, to provide more information and to discuss your results with your colleagues, you are expected to be present at your poster in the Poster Area from 15.12.2013 13:30 to 15.12.2013 14:30.

INSTRUCTIONS FOR POSTER PRESENTERS

- Each poster will be displayed for **one day only**.
- At least one presenter is required to be present during the poster presentation day.
- All posters must be put up no later than 09:00 on the day of presentation and must be taken down by the end of the presentation day. Unclaimed posters will be taken down and disposed at the end of the presentation day.

Poster Size

The poster board assigned to each presenter is 2.5 m in height (H) by 1m in width (W). Only one board will be assigned for each poster presentation. The recommended size of poster is **A0 Size – 1189mm (H) by 841mm (W)** in **portrait** orientation.

Poster Display and Presentation

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¹ Mounting: Mounting material will be available at the Poster Help Desk and/or on the poster board.
² Display: Posters should be displayed according to your assigned poster number on assigned day.
³ Poster Presentation Schedule: All authors are kindly requested to be present at their posters.
Dismantling: Posters need to be dismantled after the last Afternoon Coffee Break of assigned day. The Meeting Organizers take no responsibility for posters which are not dismantled on time.

Should you have any queries, please do not hesitate to contact Maybo Fok (iofhongkong2013@icc.com.hk).

**Important Note**
Presenting authors of accepted abstracts are required to be registered delegates and be responsible for all expenses incurred in the production of their presentations, travel and accommodation during the Meeting.

IOF thanks you for your valuable contribution to the IOF Regionals – 4th Asia-Pacific Osteoporosis Meeting’s scientific programme.

We look forward to seeing you in Hong Kong!

With kindest regards,

Cyrus Cooper  
Meeting Co-Chair  
Scientific Committee

Tai-Pang Ip  
Meeting Co-Chair  
Scientific Committee