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The Abstract should be informative and completely self-explanatory, briefly present the topic, state the scope of the experiments, indicate significant data, and point out major findings and conclusions. The Abstract should be 100 to 200 words in length. Complete sentences, active verbs, and the third person should be used and the abstract should be written in the past tense. Standard nomenclature should be used and abbreviations should be avoided. No literature should be cited.

Following the abstract, about 3 to 10 key words that will provide indexing references to should be listed. A list of non-standard Abbreviations should be added. In general, non-standard abbreviations should be used only when the full form is very long and used often. Each abbreviation should be spelled out and introduced in parentheses the first time it is used in the text. Only recommended 31 units should be used.

The Introduction should provide a clear statement of the problem, the relevant literature on the subject, and the proposed approach or solution. It should be understandable to colleagues from a broad range of scientific disciplines.

Materials and methods should be complete enough to allow experiments to be reproduced. However, only truly new procedures should be described in detail; previously published procedures should be cited, and important modifications of published procedures should be mentioned briefly. Capitalize trade names and include the manufacturer's name and address. Subheadings should be used. Methods in general use need not be described in detail.
Full Length Research

Analysis line strength trabeculae condyle panoramic radiograph to diagnose osteoporosis at woman post menopause (Comparison: Four region of interest)

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The analysis is based on the pattern of trabecular osteoporosis using panoramic radiographs are still difficulties for determin Region of Interest (ROI). Region Of Interest (ROI) is appropriate that the bone formation enchondral is lacking, many containing trabecular, has a big load and avoid local effects such as chronic infection, then the ROI condyle is the best alternative. This researched uses line strength; Sampling taken is the image of anterior, central, and posterior part of condyle head and condylar neck with Region of Interest (ROI) with 30×30 pixel. Image noise is eliminated by using the two levels of Gaussian pyramid filter. Then the line strength for each pixel is calculated after binarization is conducted. The segment width is calculated and compared by using threshold value. When the width is more than threshold value, the condition is normal, while if it is under the threshold value, the condition is known as osteoporosis. This experiment on 112 data shows that there is a difference in region at head condyle with ROI on anterior, central, and posterior part the same with namely not signifikan. The Condyle neck region is devide two groups (normal, osteopeni and osteoporosis) is significant, with Sensitivity 94,3%, and Specificity 47,37 % and cut off point ≤ 94,1 Concluded: ROI right condyle neck the best for used in analyzing osteoporosis by using line strength trabeculae pattern with panoramic.

Key words: Condyle, line strength, panoramic, trabecular pattern.

INTRODUCTION

Osteoporosis is a common disease for elderly, It causes bone fracture hip, Lumbar spine, wrist, and mandible. Mandible fracture the biggest prevalence at condyle neck is 29%, and symphysis 25% (Langlanc and Robert, 1997; Amer et al., 2012). Some epidemiologic research reports that temporomandible disorders are twice as common in women as in men. This shows the involvement of sex hormones, such as estrogen, in this pathogenesis disease. This has been proved in a research which shows that TMJ damage is in line with the fluctuation of blood estrogen levels. This means that the lower the blood estrogen level, the higher the possibility of Temporo Mandible Disorder (TMD) (White and Pharaonah, 2004; Epstein and Weissberg, 2001).

Estrogen decrease on post menopausal women can inhibit the calcification process in bone trabecular biggest than cortical (Yang J., 2011). A decrease in the density of trabecular structure mainly occurs in the bone formed enchondral and has the greatest burden as lumbar spine and femur. Condyle that receive the greatest load in the system stomatognati and formed enchondral (Tanaka et al., 1999; Kouxx. 2008; Shimamoto et al., 2007; Michael et al., 2012). Anatomically, condyle consists of a head and neck of the condyle which is the smallest dimension of the condyle, and has 98.4% of trabecula (Okeson, 2001).

The head of the condyle has three surfaces that receive different load. The anterior part receiving the

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greatest burden then superior and posterior. Analysis results obtained using CT anterior surface has the most dense trabecular structure. The burden of three surfaces will be channeled to the center of the condyle that looked envisaged under normal circumstances trabecular dense. The density will vary with the effect of a decrease in estrogen in models of osteoporosis (Rat and monkey). The burden of three surfaces will be channeled to the center of the condyle head and neck condyle which will affect the trabecular pattern (Gusson M Arnett et al, 2012). The study by using finite element shows that when occlusion Occurs, condyle receives the greatest load because it functions as fulcrum and the jaw as the lever (Ruijven et al, 2002 ). Condylar head has the greatest load to be distributed to the condylar neck greatly roomates can activate osteoclasts to Accelerate the estrogen effect (Stenson, 2001; Muhlberger et al., 2009). Research in animal fund biggest change occurred in the central head of the condyle.

Humans have different patterns of mastication, food, load and duration of estrogen decline. Mastication patterns can alter the load distribution is received and one of the factors that cause changes in the trabecular direction (Ruijven et al., 2005; Ruijven et al., 2002; Yang et al., 2012).

Trabecular pattern detection based on the direction of trabecular effectively with line strength method, for calculating the trabecular area in the direction of the most affected. One of the factors that determine bone quality analysis one of them the determination of the right ROI.

The purpose this study was to find the best ROI by comparing multiple ROI contained in the condyle using strength line method using the panoramic radiograph.

MATERIALS AND METHODS

This research passed the Ethical Clearance Examination conducted by the Board of Ethical Clearance of Faculty of Medicine Padjadjaran University of Indonesia. All patients provided written informed consent. The population targeted in this research is all menopausal women in East Java ranging from 49 to 75 years in Dental Hospital Unpad Bandung (RSGM) to undertake BMD test by using DEXA scanner on the spine page (L2-L4) and Digital panoramic roentgenography. The equipments used in this research: Computer unit, Intel Pentium Dual core processor, 2 Ghz, Ram 4GB, Samsung screen, Progrem soft were equipped with toolbox freeware scientific image processing dip image to process image, trabecula morphology, and marrow. Digital panoramic roentgenography, Vatec Korinifizca, 12 mA, 70 and 80 Kvp, Screen speed 200, Scanner Dual X-ray Absorptiometry (DXA), Merk: Lunar Corporation, Madison, Wisconsin, USA.


Exclusion criteria, Radiograph cannot be interpreted because superimposed with the other bones in ROI.

This research is correlational analysis with cross sectional as the techniques of sampling. Trabecular structure is analyzed by using statistical approach to determine bone quality by using region of interest (30x30 pixel) from different places Figure (1), left and right on the condylar head (posterior, central, and anterior). After that, the same process study is implemented in condylar neck. Original image (A and B). Line strength image (C and D). Binary image (E and F).

Image sample is taken from the condylar head in three different location which are posterior, central, and anterior and one condylar neck just like in Figure 2. The image will be cropped and noise will be eliminated by using the two levels of Gaussian pyramid filter before binarization is performed (Figure 3a).

Analysis procedure of trabecular pattern

Trabecular is analyzed by using multiscale line operator Gaussian pyramid. This method is one of the line detection algorithm method used to detect linear image structure. This multiscale line operator needs angle (Ω) dan length (M) parameter. The angle of rotation reaches 180°. The length parameters are needed to make the window movement with length M. The window size is 5x5 with 24 pixel resolution. Given a region of interest image at each pixel (x, y), multiscale line operator algorithm measures the line strength S(x,y) by subtracting the background from the foreground. For each angle, foreground mask has the length M, thickness of one pixel, angle orientation, and foreground value F(x,y,0). Then add the multi pixel value with those that relate to the foreground mask value. To acknowledge the background value, B(x,y,0) multi pixel image correlated with the background is calculated (Ruijven et al., 2002). Before the line strength of trabecular structure is measured, image is transformed into binary image Figure 3.

RESULTS

All subject were postmenopausal women number of 112 patients aged 49-75 years. DEXA examination results showed that normal = 60, osteopenia = 36 and osteoporosis = 16, using panoramic radiograph (Table 1).

The average age the normal group: 61.6 and osteopenia group: 51.3 where as 64.2 osteoporosis. Osteoporosis age group the tendency is older than the normal group and osteopenia group. Furthermore, the score line showed strength on The head and neck condyle right and left on the Table 2.
The results of the analysis on the anterior part of the right condyle head was found average normal group score: 87.7; osteopenia: 86.4 and osteoporosis 83.1. From the results of the analysis have not been able to differentiate into three groups.

The results of the analysis on the posterior condyle head right it was found average that in the normal group: score: 88.6; osteopenia: 82.5 and osteoporosis: 85.8 of the results of the same analysis cannot be grouped into three.

The results of the analysis in the central part of the condyle head right it was found average that in the normal group score: 95.9; osteopenia: 96.1 and osteoporosis: 94.3 of the results of the analysis using no significance.

The results show the score line analysis of the right condyle neck trabecular strength in the normal group average: 92.8, average osteopenia: 92.2 and osteoporosis average: 84.7 in Table 3.

The results are still not able to be classified into three groups. Results of the analysis on the anterior part of the left condyle head was found that in the normal group: score: 87.8; osteopenia: 85.8 and osteoporosis: 82.6. Results did not show the difficulty of grouping into three.

The results of the analysis on the posterior part of the left condyle head was found that in the normal group score: 86.6; osteopenia: 80.3 and osteoporosis: 86.3. The results of the analysis in the central part of the left condyle head was found that in the normal group score: 95.0; osteopenia: 96.6 and osteoporosis: 93.6. While the results of the analysis of the score line analysis of the condyle neck trabecular strength left in the normal group average: 90.0 and 91.9 average osteopenia and osteoporosis average: 85.2. Based on the analysis of
(A) Left and right side head condyle original image

(B) Left and Right side neck condyle original image

(C) Line strength detection applied to images in (A)

(D) Line strength detection applied to images in (B)

(E) Binary detection applied to image in (C)

(F) Binary detection applied to images in (D)

Figure 3. Preprocessing.
Table 1. Characteristic subject.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Normal (n=60)</th>
<th>Osteopenia (n=36)</th>
<th>Osteoporosis (n=16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age (SD)</td>
<td>61.8(9.9)</td>
<td>61.3(9.9)</td>
<td>64.2(9.4)</td>
</tr>
<tr>
<td>2. High (SD)</td>
<td>153.1(6.2)</td>
<td>150.1(4.2)</td>
<td>150.8(2.6)</td>
</tr>
<tr>
<td>3. Weight (SD)</td>
<td>64.2(10.3)</td>
<td>58.1(3.0)</td>
<td>55.3(8.2)</td>
</tr>
</tbody>
</table>

Table 2. Comparison of trabecular strength score line ROI the ROI head and neck condyle condyle in three groups of bone quality.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Normal (n=60)</th>
<th>Osteopenia (n=36)</th>
<th>Osteoporosis (n=16)</th>
<th>Value p</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROI 1</td>
<td>92.8(9.9)</td>
<td>92.2(9.9)</td>
<td>84.7(7.2)</td>
<td>0.009</td>
</tr>
<tr>
<td>ROI 2</td>
<td>90.0(10.3)</td>
<td>91.9(10.0)</td>
<td>85.2(7.4)</td>
<td>0.084</td>
</tr>
<tr>
<td>ROI 3</td>
<td>87.7(3.3)</td>
<td>83.1(6.2)</td>
<td>86.4(7.3)</td>
<td>0.140</td>
</tr>
<tr>
<td>ROI 4</td>
<td>88.6(3.7)</td>
<td>82.5(4.2)</td>
<td>85.8(6.2)</td>
<td>0.150</td>
</tr>
<tr>
<td>ROI 5</td>
<td>87.8(4.1)</td>
<td>82.6(4.4)</td>
<td>85.8(8.3)</td>
<td>0.170</td>
</tr>
<tr>
<td>ROI 6</td>
<td>88.9(3.4)</td>
<td>80.3(3.7)</td>
<td>86.3(7.0)</td>
<td>0.190</td>
</tr>
<tr>
<td>ROI 7</td>
<td>95.9(7.4)</td>
<td>96.1(8.2)</td>
<td>94.3(8.2)</td>
<td>0.717</td>
</tr>
<tr>
<td>ROI 8</td>
<td>95.0(9.6)</td>
<td>96.6(8.0)</td>
<td>93.6(7.2)</td>
<td>0.475</td>
</tr>
</tbody>
</table>

variance and Duncan analysis of normal and osteopenia group average no significance. If combined so into two groups: normal/osteopenia and osteoporosis in Table 4.

Based on the results of the t-test, it was found just the right condyle neck ROI signifika with p <0.002. While ROI right condyle head all nc significance.

Based on the results of the t test, it was found just the right condyle neck ROI significance with p <0.041. While ROI condyle head left all no significance.

**DISCUSSION**

Studies proved that the bones condyle is good for objects used for early detection of osteoporosis. The mandible condyle receives the greatest load when the system functions in stomatognati. The content found on the trabecular most condyle that is 98.6% (White, 2000; Muhlberger et al., 2009).

Histologically, hypertrophic stratum Occurs from cartilage thinning, the number of cartilage cells decreased on ovariectomy, and cartilaginous ossification decreases, this Affects the bone quality (Yang et al., 2012).

Moreover, mandible body develops as membranous bone that grow from mesenchymal cells of Meckelian cartiages (left and right) and fusi in the middle forming one bone. Condyle is formed by cartilage, developed forward, and united evenly (Ciba et al., 2006). This condition raises a presumption that the differences of the effects on postmenopausal osteoporosis between the mandible body and condyle is controlled by the difference of ossification and mastication load by the teeth occlusion (Shimamoto et al., 2007). Condyle avoid local effects such as chronic infections such as the alveolar mandible body.

The occlusal and mastication function of monkey different from Reviews those of humans due to different in the anatomical structure of stomatognatic system and the Antero posterior and lateral movement of the jaw makes load differences are accepted and trabecular reaction will occur.

There are differences in the study to the head of the condyle humans under normal circumstances by using CT was found that there are differences in patterns of trabecular and cortical condyle Research have use 4 ROI left and 4 ROI right. Three ROI on condyle head (posterior, central and anterior), the superior is not done.
Table 4. Comparison of the score line strength in the two groups (normal / osteopenia and osteoporosis) with ROI 1 and 2. From the analysis sensitivities, specificity and accuracy.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value cut off</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROI 1</td>
<td>&gt;94.1</td>
<td>94.3</td>
<td>47.37</td>
</tr>
<tr>
<td>ROI 2</td>
<td>&gt;92.8</td>
<td>93.75</td>
<td>42.11</td>
</tr>
</tbody>
</table>

(B)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Koefisien B</th>
<th>SE (B)</th>
<th>Value p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial model</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROI 1</td>
<td>2.437</td>
<td>1.208</td>
<td>0.044</td>
</tr>
<tr>
<td>ROI 2</td>
<td>1.820</td>
<td>1.277</td>
<td>0.154</td>
</tr>
<tr>
<td>Final Model</td>
<td>3.295</td>
<td>1.110</td>
<td>0.003</td>
</tr>
</tbody>
</table>

because many superimpose. ROI on condyle neck radiograph may reveal the most good. This research was conducted by using Line strength, which is a method that can detect more sharply against the direction of trabecular structures. Processing line for strength analysis, it is important to remove low frequency noise from the radiographs. The condyle regions are surrounded by cortical bone and soft tissue with various thickness. They influence the mean gray level significantly and exhibit a low frequency noise (Amer et al., 2012). To remove the noise, we subtracted the blurred image obtained by Gaussian filtering, kind of low pass filtering, from the original image (Amer et al., 2012). This suggests that each site has a different anisotropy which characterizes the degree of the directional organization of material. The more preferential direction the structure has, the more important the degree of anisotropy. Anisotropy is influenced by the main direction of strength applied to the bone (Ruijven et al., 2005, 2002).

Results of strength on the score line ROI right anterior condyle head better results compared to the ROI in the left anterior condyle head contrasted bone quality into three group (normal, osteopenia and osteoporosis). Although ROI head right anterior condyle best response to changes in bone quality, Duncan test results it cannot be divided into three groups (normal, osteopenia, osteoporosis). Resolution radiographs have not been able to differentiate into three groups. Score value normal trabecular and osteopenia in general for all ROI there is no difference in significance. Difficulties due to changes in the grouping into three osteopenia are still small, inconsistent location trabecular pressure changes due to differences in the pattern of mastication difficult to detect in radiographs. According to the research of Agus et al. (2011), strength line method can detect osteoporosis in apical region first molars, cannot distinguish the normal group and osteopenia (Arifin et al., 2010). Factor of the load, the load direction and frequency play a role in the difficulty distinguishing between normal and osteopenia. The line strength analysis can be more accurate for load detection direction effect that occurs in the apical trabecular molar under one of the important factors that correlate with the complexity and bone structure (Graets, W.G., Van der Stel, P.F. 2000, Arifin et al., 2010). After the bone quality made into two groups (normal osteopenia and osteoporosis). Result the t-test results showed that the ROI in the posterior part of the condyle head, superior and right and left anterior although group into two qualities of bone still cannot different into two groups (normal / osteopenia and osteoporosis). In contrast to research on monkey in the head of the condyle can distinguish between normal group and osteoporosis group (Shimamoto et al., 2007). The differences can be due to differences in the pattern of mastication, where in humans there is anterior posterior and lateral movement. Diet such as type of food, consistency, amount and duration cannot be conditioned as in animal experiments. ROI neck right condyle can distinguish normal/osteopenia and osteoporosis in significance with p = 0.002, while the left condyle neck ROI can also distinguish between the two groups (normal / osteopenia and osteoporosis) in significance with p = 0.041. ROI right condyle neck is the best part in the condyle for the detection of osteoporosis using the line strength. Right condyle neck relatively more apparent with trabecular structure more clearly in the vertical direction. Anatomical factors play an important role because of its structure, the direction of the load and give a different response to the decline estrogen. The shape of the trabecular bone has been known to be different regions (Amoriq et al. 2011 Y.V, Amer et al., 2012). According to the anatomical shape and orientation Trabecular are adaptive to changes in the mechanical environment, such as Reviews those induced by aging or osteoporosis evident on research (Epstein and Weisberg, 2001; Yang et al., 2012). Neck condyle receives continuous pressure in the vertical direction so that the younger was detected by the method of line strength with the vertical direction. The results of the
trabecular Neck Point Cut of the right condyle in getting ≤ 94.1, thus expressed osteoporosis and if more than 94.1 score otherwise normal. The test results 94.3 Sensitivity neck and specificitas 47.37. Cut of the left condyle neck point in getting 93.75 and 42.11% specificity.

There factors that cause difficulty score consistency at the head of the condyle especially mastication pattern that cannot conditioning your monkey as in animal experiments. Can not control the length of a decline because not group by age, do not know the bone stock of each subject and cross sectional study was conducted. Type of food is also very varied, socio-economic differences.

Factors characteristic of the panoramic radiograph is often the case superimpose, exposure system that rotation makes large opportunities consistent lack of radiation received by the sensor. Variations arch have different mandibular body length and height of different condyle, will affect the projection radiographs (Azhari et al., 2014). Differences thick cheek soft tissues such as muscle and muscles of mastication will lead and position the patient's head that would cause differences in x-rays received by the head of the condyle (Langland and Robert, 1997).

Conclusions

ROI right condylar neck can be used in analyzing osteoporosis by using line strength trabecula pattern with panoramic. Suggestion: it is necessary to conduct further research to need a method that can determine a constant factor in the condyle is the reference as deduction, so that the effects of exposure and superimpose on the network can have a constant value.

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