

**TESIS**

**PENGARUH PEMBERIAN SUSU YANG DIFORTIFIKASI (KALSIUM  
DAN VITAMIN D) DAN SENAM OSTEOPOROSIS TERHADAP  
KEPADATAN TULANG PADA WANITA PRA LANSIA  
(50-59 TAHUN) DI WILAYAH KERJA  
PUSKESMAS BANYUANYAR  
KABUPATEN SAMPANG**



**DESY PRASETYA**

**UNIVERSITAS AIRLANGGA  
FAKULTAS KESEHATAN MASYARAKAT  
PROGRAM MAGISTER  
PROGRAM STUDI ILMU KESEHATAN MASYARAKAT  
SURABAYA  
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**DESY PRASETYA  
NIM. 101314153016**

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**TESIS**

**Untuk memperoleh gelar Magister Kesehatan  
Minat Studi Gizi Kesehatan Masyarakat  
Program Studi Ilmu Kesehatan Masyarakat  
Fakultas Kesehatan Masyarakat  
Universitas Airlangga**

**Oleh:**

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FAKULTAS KESEHATAN MASYARAKAT  
PROGRAM MAGISTER  
PROGRAM STUDI ILMU KESEHATAN MASYARAKAT  
SURABAYA  
2015**

## PENGESAHAN

**Dipertahankan di depan Tim Penguji Tesis  
Minat Studi Gizi Masyarakat  
Program Studi Ilmu Kesehatan Masyarakat  
Fakultas Kesehatan Masyarakat Universitas Airlangga  
dan diterima untuk memenuhi persyaratan guna memperoleh gelar  
Magister Kesehatan (M.Kes.)  
pada tanggal 12 Agustus 2015**

**Mengesahkan :**

**Universitas Airlangga  
Fakultas Kesehatan Masyarakat**

**Dekan,**



**Prof. Dr. Tri Martiana, dr., M.S.  
NIP. 195603031987012001**

**Tim Penguji :**

**Ketua : Prof. Kuntoro, dr., M.PH., Dr.PH**  
**Anggota : 1. Prof. Bambang W., dr., M.S., MCN., Ph.D., Sp.GK**  
**2. Dr. Merryana Adriani, S.KM., M.Kes**  
**3. Dr. Sri Hartiningsih, dr., M.Kes**  
**4. Asrul Sani, S.KM., M.Kes**

**PERSETUJUAN**

**TESIS**

**Diajukan sebagai salah satu syarat untuk memperoleh gelar  
Magister Kesehatan (M.Kes.)  
Minat Studi Gizi Kesehatan Masyarakat  
Program Studi Ilmu Kesehatan Masyarakat  
Fakultas Kesehatan Masyarakat  
Universitas Airlangga**

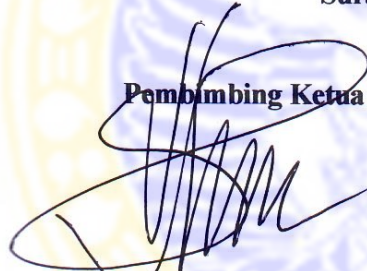
**Oleh :**

**DESY PRASETYA  
NIM. 101314153016**

**Menyetujui,**

**Surabaya, 12 Agustus 2015**

**Pembimbing Ketua**



**Prof. Bambang W., dr., M.S., MCN., Ph.D., Sp.GK  
NIP. 194903201977031002**

**Pembimbing**



**Dr. Merryana Adriani, S.KM., M.Kes  
NIP. 195905171994032001**

**Mengetahui,**

**Plt. Koordinator Program Studi Ilmu Kesehatan Masyarakat**



**Nurul Fitriyah, S.KM., M.PH  
NIP. 197511212005012002**

## PERNYATAAN TENTANG ORISINALITAS

Yang bertanda tangan di bawah ini, saya:

Nama : Desy Prasetya  
NIM : 101314153016  
Program Studi : Ilmu Kesehatan Masyarakat  
Minat Studi : Gizi Kesehatan Masyarakat  
Angkatan : 2013  
Jenjang : Magister

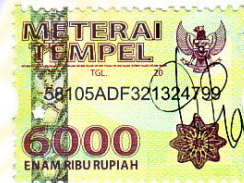
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**PENGARUH PEMBERIAN SUSU YANG DIFORTIFIKASI (KALSIUM DAN VITAMIN D) DAN SENAM OSTEOPOROSIS TERHADAP KEPADATAN TULANG PADA WANITA PRA LANSIA (50-59 TAHUN) DI WILAYAH KERJA PUSKESMAS BANYUANYAR KABUPATEN SAMPANG**

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Demikian surat pernyataan ini saya buat dengan sebenar-benarnya.

Surabaya, 12 Agustus 2015



Desy Prasetya

## KATA PENGANTAR

Puji syukur kehadirat Allah SWT atas karunia dan hidayah-Nya sehingga penyusunan tesis dengan judul **“Pengaruh Pemberian Susu yang Difortifikasi (Kalsium dan Vitamin D) dan Senam Osteoporosis terhadap Kepadatan Tulang Wanita Pra Lansia (50-59 Tahun) Di Wilayah Kerja Puskesmas Banyuwang Kabupaten Sampang”** ini dapat terselesaikan.

Tesis ini berisi penelitian tentang pengaruh pemberian susu yang difortifikasi (kalsium dan vitamin D) terhadap kepadatan tulang wanita pra lansia usia 50-59 tahun karena mereka merupakan kelompok yang berisiko mengalami defisiensi dan telah memasuki usia menopause. Selain itu, kondisi fisiologis mereka juga telah mengalami penurunan kemampuan absorpsi di usus halus sehingga salah satu cara untuk meningkatkan absorpsi adalah dengan melakukan olahraga berupa senam osteoporosis. Dengan latar belakang semakin meluasnya penurunan kepadatan tulang serta meningkatnya dampak yang ditimbulkan akibat permasalahan tersebut maka penelitian ini dilakukan.

Ucapan terima kasih penulis sampaikan kepada Prof. Bambang W., dr., M.S., MCN., Ph.D., Sp.GK, sebagai Pembimbing Ketua yang telah memberikan bimbingan dan masukan sehingga tesis ini dapat terselesaikan dengan baik. Ucapan terima kasih juga penulis sampaikan kepada Dr. Merryana Adriani, S.KM., M.Kes, sebagai pembimbing kedua yang telah memberikan bimbingan, motivasi, dan saran demi kesempurnaan tesis ini.

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2. Prof. Dr. Tri Martiana, dr., M.S., selaku Dekan Fakultas Kesehatan Masyarakat.
3. Nurul Fitriyah, S.KM., M.PH, selaku Plt. Koordinator Program Studi Ilmu Kesehatan Masyarakat.
4. Prof. Bambang W., dr., M.S., MCN., Ph.D., Sp.GK, selaku Ketua Minat Studi Gizi Kesehatan Masyarakat.
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Demikian, semoga tesis ini bisa memberikan manfaat bagi penulis sendiri dan pihak lain yang menggunakan.

Surabaya, Agustus 2015

Penulis





## SUMMARY

### **The Effect of Fortified Milk (Calcium and Vitamin D) and Osteoporosis Gymnastics on Bone Density in Pre Elderly Women (50-59 years) at Work Area of Puskesmas Banyuanyar Sampang**

Disorders of bone density is currently a major public health problem that affects millions of people in worldwide. Disability due to musculoskeletal disorders especially osteoporosis and fracture which is included in non-communicable diseases has increased by 45% from 1990 to 2010 copared with a 33% average across all other chronic diseases. In Indonesia, prevalence data of osteoporosis is quite rare.

One of the groups at risk of developing disorders of bone density is pre elderly woman. With increased age, the balance between bone breakdown (or resorption) and bone building (or formation) tends to get out of balance, with greater resorption than formation. This is likely due to a number of factors, including the decline in sex hormone (estrogen) levels in woman after menopause, insufficient dietary intake of calcium, and/or inadequate vitamin D. This imbalance in bone remodelling leads to progressive bone loss, a decline in bone strength and ultimately an increased risk of fracture due to osteoporosis. Osteoporosis is a condition of bone loss due to lack of bone density because of a deficiency of calcium dan vitamin D.

The body gets vitamin D from the food intake. The endogenous source of vitamin D is from the body itself with the help of sun exposure (ultraviolet B). The sun exposure converts the form of vitamin D in the skin into vitamin D<sub>3</sub>. the active vitamin D plays a role in calcium absorption in the intestine. This mineral help in bone mineralization. Due to that role, calcium absorption can be obstructed if there is deficiency of vitamin D in the body. As the result, the process of bone mineralization (formation) will also be obstructed.

Moderate intensity exercise and adequate calsiium intake can improve bone strength. Exercise also alter motility and permeability of the small intestine so that absorption increases. Exercise done by people who have suffered from osteoporosis is osteoporosis gymnastics.

Based on the problem described above and also according to the importance of fulfilling the nutritional needs of a pre elderly woman, especially in vitamin D and calcium for bone mineralization pre elderly woman so the researchers treated form of milk fortified with calcium and vitamin D, as well as to improve the absorption of calcium through gymnastics osteoporosis. The aim of this study was to analyze the effect of fortified milk (calcium and vitamin D) and osteoporosis gymnastics on bone density in pre elderly women (50-59 years) at work area of Puskesmas Banyuanyar sampang.

This study was an quasi experimental, with non equivalent control group design and with double blind. The research location was in Puskesmas Banyuanyar working area, Sampang. The study population was all pre elderly

woman who participated in the elderly Posyandu. Then, the initial data was collected with the inclusion criteria for pre elderly woman were: (1) women aged 50-59 years, (2) does not have a history of lactose intolerance, (3) does not have a history of liver disorders and kidney disease in the anamnesis, genetic, skin pigmentation, malabsorption, normal nutritional status, (4) do not have the habit of eating salty foods rich in salt, too sweet, fizzy drinks and drinks containing caffeine, (5) have menopause, (6) is willing to be involved in the study and signed an informed consent. The sampel size for each group was 15 people. So the total sample in this study was 45 people. Study group consisted of three groups of the first group were given a form of gymnastics osteoporosis treatment, second groups were treated osteoporosis gymnastics and milk fortified with calcium and vitamin D, and the control group. Food consumption with 24-hour recall, food consumption patterns with food frequency questionnaire, serum of calcium concentrations were measured by Photometric Test and bone density was measured by bone ultrasonometer (bone density).

There was no a significant effect of calcium serum concentration on bone density in first treatment group ( $p = 0,374$ ), in the second treatment group ( $p = 0,066$ ), and in the control group ( $p = 0,799$ ).

There was a significant effect of fortified milk (calcium and vitamin D) and osteoporosis gymnastics on bone density ( $p = 0,037$ ). There was no a significant effect of osteoporosis gymnastics on bone density ( $p = 0,157$ ). There was no a significant effect of control group on bone density ( $p = 0,157$ ).

An increase in bone mineral density is not solely due to the influence of gymnastics, but also due to the effect of the intake of calcium and vitamin D. Most of the respondents experienced improvement or increase in the numbers of bone density, but rarely followed by repair category better. This study highlights the importance of improving exposure of ultraviolet B, the calcium, vitamin D, energi, corbohydrate, fat, and protein, calcium serum status, and bone mineral density of pre elderly woman living in the study area. Pre elderly woman should increase their intake of calcium and vitamin D by consuming milk and following existing programs in posyandu elderly such as gymnastics because the benefits of optimal nutrition and physical activity such as gymnastics can have greatest impact of bone mineralization for pre elderly woman. Moreover, it also could be prevent further bone loss in elderly mowan.