RESEARCH ARTICLE

ARE WOMEN ALWAYS MORE VULNERABLE THAN MEN?

Tita Hariyanti[1], Sri Sunarti[2] and Alifia Aprilliani[3].
Faculty of Medicine University of Brawijaya, Malang.

……………………………………………………………………………………………………....

Manuscript Info	Abstract

Manuscript Info …………………….

Abstract
…………………………………………………………………

Background: Frailty is a syndrome in the elderly that occurs due to reduced reserve capacity and function of several organs caused by several risk factors such as demographic characteristics. This study aims to determine the relationship between these characteristics with the occurrence of frailty.
Method: The data collection was done by interviewing and CHS (Cardiovascular Health Study) criteria. Respondents who successfully collected a number of 222 people aged> 60 years in Malang. The relationship of demographic characteristics with frailty in this study was tested by using chi square analysis.
Results: In elderly study in five sub-districts in Malang City, 46.4% of respondents were in prefail category. Most respondents (55.4%) experienced weakness when asked to hold a hand-held dynamometer.
Conclusion: Age, education level and marital status are related to the occurrence of frailty. Only one demographic characteristic is not related to frailty, ie sex.

……………………………………………………………………………………………………....

Forewords:-

In 2011, nearly 10% of Indonesia's population is elderlies, which are around 24 millions with each year increasing up to 450.000 per year. This makes the increase of living quality for the elderlies become very important[1]. According to theory by Blum, the health status of an individual is affected by 4 essential factors, which are genetics, behaviors, physical and socio-cultural environment, and health facilities[2]. These four factors are factors for community health that may share similarities in society, as for individual health, apart from the four factors, internal individual factors also play a role, such as age, sex, education, and so on[3].

Due to frailty being a biological syndrome that is caused by multisystemic degradation on physiological reserves, various risk factors are involved in the cause. These risk factors are substandard socio-economic level, solitary living, comorbidity, certain chronic diseases, and chronic infflamatory markers such as C-reactive protein (CRP) and interleukin-6 (IL-6)[4]. Frailty can be measured using numerous instruments, among which are Frailty Index, CSHA score, and CHS Index that are developed by Fried. According to Fried et al., an individual is considered frail if they meet three or more of the following criteria; weight loss, fatigue, weakness, low walking speed, and low physical activity. These criteria have been validated and modified to be used on various published research on elderlies

Demographically, frailty prevalence on elderlies depends on age and sex. According to several studies, female suffers frailty more than males. Gale noted that 12% male respondents and 16% respondents suffer from frailty on 5.450 elderlies in England[6]. As age increases, fraily prevalence also increases. In a research performed on 1.327

Corresponding Author:-TitaHariyanti.
Address:-Faculty of Medicine University of Brawijaya, Malang.

elderlies in Madrid, frailty prevalence on elderlies aged 75 years and above is equal to 19.1%, while on elderlies aged under 75 years is equal to 1.4%[7]. Apart from age and sex, marital status is a social aspect that also correlates with frailty[8]. Frailty occurs less often among married people than unmarried people[9]. Aside from previously mentioned demographic factors, low education level is also a risk factor of frailty[7, 10, 11]. Based on that, the researcher is fascinated to discover the relationship between demographic characteristics, namely; age, sex, education level, and marital status with frailty prevalence on elderlies in Malang City.

Research Methods:-
Population and Samples:-
The population in this research is elderlies that reside in Malang City. Sampling is done via accidental sampling method, from five districts (kecamatan) in Malang City. The Chosen population that have stated their willingness to participate are then further checked their frailty condition. Samples are a small portion from then researched population. The amount of samples on an unknown population can be determined by an equation as follows:[12]

$$n = \frac{(Za)^2(p)(q)}{d^2}$$

Keterangan :-

N : Amount of samples
Za : Standard normal value that depends on a
    If a = 0,05 then z = 1,67
    If a = 0,01 then z = 1,96
p : Unknown population proportion estimator = 0,5
q : 1 – p
d : Precision (inaccuracy tolerance percentage/error limit) 5%

Based on the equation above using a = 0,05, the amount of samples calculated is equal to 279 people. The amount of sample is proportionally determined on the 5 districts, which is shown below:

Table 1:- Population and Sample distribution in the 5 districts of Malang City as of 2016.[13]

No	Districts	Population	Samples
1.	Blimbing	16.815 / 67.419 x 279	70
2.	Klojen	12.596 / 67.419 x 279	52
3.	Kedung Kandang	6412 / 67.419 x 279	26
4,	Sukun	16.620 / 67.419 x 279	69
5.	Lowokwaru	14.976 / 67.419 x 279	62
Total			279

However, based on the findings on the field, researcher were only able to acquire 222 respondents with some not being able to meet inclusive criteria and are refusing to participate, with also human, time, and financial resource limitations.

Research Variables:-
This research utilizes dependent variables such as frailty degree, with the independent variables being age, sex, education level, and marital status. The control variable is that the subject is aged above 60 years.

Determination of Demographic Characteristics:-
1. **Sex**:- Data is collected from anamnesis, physical appearance or from ID cards. This research categorizes this aspect into two; male and female.
2. **Age**:- Data is collected from anamnesis, ID cards, or from elderly health centre (posyandu). Respondents eligible for this research are aged 60 years or above. This research categorizes this aspect into aged 60-64,9 years, aged 65-69,9 years, aged 70-74,9 years, and aged ≥75 years.
3. **Education level**:- Data is collected from anamnesis, ID card or diploma. This research categorizes this aspect into low education level (no education at all, or middle school graduate or equivalent) and high education level (high school graduate or above).
4. **Marital status**:-Data is collected from anamnesis. This research categorizes this aspect into married, not married, divorced, and widow or widower (an individual whose spouse have died).

Frailty Degree Calculation:-
Frailty condition is calculated using Fried's criteria (CHS), which are:
1. **Weight loss**:-
    Weight loss is defined as involuntary loss of > 4,5 kg ot5% in the past year.
2. **Fatigue**:-
   If a participant answers "Often" or "Most of the time" on at least one of the question "do you feel that you should put more effort on doing your responsibilities?" and "are you not able to continue the activity you are currently doing?".
3. **Low physical activities**:- Asks "do you do physical activities?".Low physical activities can be identified if participants go through 3 months without weight-bearing activities or spend >4 hours sitting or do a short walk <1 per month.
4. **Low walking speed**:-
   Participants are asked to walk in normal speed for 4,5 meters. Measurement is performed twice. Low walking speed can be identified if the duration is >7 seconds for male with height ≤ 173 cm and female with height ≤ 159 cm, and > 6 seconds for male wirh height> 173 cm and female with height> 159 cm.
5. **Weakness**:-
    Weakness is measured using grip strength through hand-held dynamometer. Participants are asked to perform grip strength test on their dominant hand twice. Participants are grouped according to Body mass index (BMI) and sex. Weak strength grip can be idenfitied if the grip strength is ≤ 29 kg for BMI ≤ 24 kg/m^{2}for male, and ≤ 17 kg for BMI ≤ 23 kg/m^{2}for female.

Frailty syndrome measurement result is categorized in three groups:-
1. *Frail*. Subjects can be considered frail if they meet 3 or more frailty phenotypes that is identified using Fried's frailty criteria (CHS) above.
2. *Pre frail.* Subjects can be considered pre frail if they meet 1 or 2 frailty phenotypes that is identified using Fried's frailty criteria (CHS) above.
3. *Robust*. Subjects can be considered robust if they do not meet any of the frailty phenotypes that is identified using Fried's frailty criteria (CHS) above.

Data Analysis:-
Data collection used in this research is direct field observation by sight, measurement, and interview.
1. **Interview**. Subjects aged 60 years or above are interviewed on demographic characteristics. Subjects who do not speak fluent Indonesian or are not able to comprehend Indonesian, will be interviewed by a translated version in Javanese.
2. **Measurement**. Measurement covers weight, height, walking speed, and grip strength.
3. Analysis method used is non-parametric test. Researcher uses Chi-square analysis because this research tests the relationship between independent variables with dependent variable.

Research Result:-
Respondents Characteristics and Frailty Degree:-
Based on the research result that takes place in five districts in Malang City, elderly respondents that have participated in this research are grouped into several characteristics as follows:

Table 2:-Respondents Characteristics (n=222)

Characteristics		Amount	Percentage
1. Sex			
	a. Male	47	21,2 %
	b. Female	175	78,8%
2. Age			
	a. 60-64,9 years old	69	31,1%
	b. 65-69,9 years old	52	23,4%
	c. 70-74,9 years old	49	22,1%
	d. ≥75 years old	52	23,4%
3. Marital Status			
	a. Married	107	48,2%

b. Not Married	9	4,1%
c. Divorced	4	1,8%
d. Widow/Widower	102	45,9%
4. Education Level		
a. Low Education Level	138	62,2%
b. High Education Level	84	37,8%
5. Frailty Degree		
a. Frail	79	35,6%
b. Prefrail	103	46,4%
c. Robust	40	18,0%

Source:-Research result, 2017.

According to table 2, the majority of elderly respondents participating in 5 districts in Malang are female, which makes up 78,8% of total respondents. Male respondents make up only 21,2%. Elderly respondents aged 60-64,9 years makes up 31,1% of the respondents. 23,4% of the total respondents are aged 65-69,9% years as well as respondents that are aged ≥75 years, and 22,1% respondents are aged 70-74,9 years. Married respondents make up 48,2%, widow/widower make up 45,9%, unmarried respondents make up 4,1%, while divorced make up 1,8%. Most of the elderly respondents that participated in this research have low education level, as many as 62,2% while only 37,8% have high education level. Hence, 46,4% of the elderly respondents are considered prefrail, 35,6% are considered frail, while only 18,0% are considered robust.

Frailty Criteria Specification:-
Data is then specified according to 5 frailty criteria as stated on the table below:-
Table3:-Frailty Degree Specifications

Risk Factors	Yes/ (+)		No/ (-)	
	Amount	Percentage	Amount	Percentage
1. Low Walking Speed	49	22,07%	173	77,93%
2. Weakness	124	55,86%	98	44,14%
3. Fatigue	118	53,15%	104	46,85%
4. Low Physical Activity	115	51,80%	107	48,20%
5. Weight Loss	35	15,77%	187	84,23%

Source:- Research result, 2017.

According to the specification of the 5 frailty criteria, out of 222 elderlies in Malang City, 77,93% of the respondents do not have low walking speed and 22,07% do. 55,86% of the respondents suffer from weakness while 44,14% do not suffer from weakness. 53,15% of the respondents stated that they experience fatigue while 46,85% stated otherwise. 51,80% of the respondents show sign of low physical activities while 48,20% of the respondents do not show signs of low physical activities. 84,23% of the respondents do not suffer from weight loss while 15,77% of them do.

Analysis of Correlation between Respondents Characteristics and Frailty:-
Correlation analysis among variables is used to find the relationship between category variables. Test criteria suggests if the calculated chi square ≥ table chi square or chi square probability value ≤ level of significance (alpha = α), then there is a significant correlation between those two variables. Correlation analysis result between category variables can be seen on the table below,

Table 4:-Correlation between Category Variables

Correlation		Chi Square	Probability
Variabel 1	**Variabel 2**		
Sex	Frailty Degree	5.892	0.053
Age	Frailty Degree	27.623	0.000
Education Level	Frailty Degree	12.063	0.002
Marital Status	Frailty Degree	15.208	0.019

Source:- Research result, 2017.

Based on table 4, it can be found that the correlation between sex and frailty degree results a probability value of 0.053, which means there is no significant correlation between sex and frailty in this research. The correlation result of age, education level, and marital status results a chi square value of 27.623, 12.063, 15.208, respectively and probability value of 0.000, 0.002, 0.019, respectively. Hence, it can be concluded that there is significant correlation between age, education level, and marital status, with frailty degree.

Research Discussion:-
Respondents' Characteristics:-
Demographic characteristics of respondents who are participated in this research are sex, age, marital status, and education level. The result of research conducted in five districts in Malang indicates that female elderlies are more often found than male elderlies. Population pyramid on a sensus carried out by Central Bureau of Statistics (BPS) shows that—starting from the age group of 60-64 years old—the amount of female population is more than the male population.[14, 15] This is in accordance with the life expectancy of female in Indonesia being higher than male, which is 72,59 years in comparison with 68,87 years.[16]

Social and behavioral factors which cause female's life expectancy being higher than male's are the fact that female are less likely to consume psychoactive substances, to smoke, to drink alcohol, and to be involved in risky sexual activities. Aside from that, males tend to take part in dangerous work environment and have more aggresive strategy to solving problems.[17] Males and females also have significant difference in utilizing health care, where females have significantly higher visiting rate to medical clinics and primary diagnostics, and on the other side, males tend to postpone to seek medical attention and lacks discipline in medications and medical advices.[18, 19] Males generally receive less information regarding nutritional impact on health, and they tend to not have breakfast and often consume foods that are less-variative comprising more meats with litlte to no vitamin and supplement intake.[17] There are several biological factors which causes female to have higher life expectancy. One of them is that a positive estrogenous impact towards lipid profile which cardiovascular disease tendency occurs 10 years ealier on males. Apart from that, new study shows that estrogen have additional defensive effects on cerebral area which is known to have a role in cognitive functions regarding age and Alzheimer's.[20] Females have stronger body immunity system and higher resistance towards infections.[21]

Based on respondents age groupings, research result suggests that age group of 60-64,9 years old has the highest number. This is correspondent with the sensus data that shows age group of 60-64,9 is the elderly group with the most population number in comparison with age group of 65 years and above.[14] The basis of this is that the age group of 60-64,9 is an aging process. Every individual must experience aging process. Aging process is the lfetime accumulation of molecular damages that gradually increase as time goes. The higher the damage level, the more disrupted functional performance and reserves of tissues and organs will be, this is the cause of diseases and disabilities.[22] Previous research conducted by Long et al. (2001) in Xiamen indicates that the main cause of death on elderlies is non communicable chronic diseases, which makes up 90,59% of total death cases. The decrease of elderly population number due to death of aging will increase the number of elderlies who are widow/widower.[23] On this research, elderlies who are widow/widower makes up 45,9% of the total respondents.

The majority of respondents in this research have low education level. Corresponding with the content of the Preamble of the Constitution of the Republic of Indonesia 1945, one of the Country of Indonesia's aims is to enrich the life of nation. Since then, The Government of the Republic of Indonesa has conducted a structured mandatory education program. The 6-year mandatory education program is officially planned in 1983, while the 9-year mandatory education program is issued in 1994. Economic crisis that struck Indonesia in 1997 becomes the reason why the 9-year mandatory education program is not achieved in time. The program is originally expected to be completed by term 2003/2004, but is then adjusted to term 2008/2009.[24] According to Supriyatno, the hindrance of the mandatory education program is caused by the parents' lack of tuition money, whereas free education policy through School Operational Aid (BOS) for elementary and middle school is not planned until 2008, therefore there are plenty elderlies who have low education level nowadays.[25].

In research regarding elderlies in the five districts in Malang City, the majority of elderlies are found to be in prefrail condition. Prefrail individuals are more likely to develop to become frail. They are even more likely to be ill, be hospitalized, or die, even though the risk is still lower than those who are frail.[26] This research is in accordance with research conducted by Jürschik et al. (2012) in Spanyol. This research calculated elderly prevalence who suffer

from frailty. Most of the respondents are found to be prefail, comprising of 47% while the frail respondents makes up the 9,6%.

Frailty Criteria Specifications:-
Based on the data of frailty degree specification result, the majority of respondents suffer from weakness when they are asked to grip a hand-held dynamometer, an apparatus to measure grip strength. The decrease of grip strength is considered to be the most common phenotype in the frailty characterization on elderlies. Several researchers often identifies grip strength because the phenotype is most often involved in frailty diagnosis and the decrease of physical activity as the least often involved.[27] Another research discovers that muscle weakness manifests the first time and tends to be reversible, while fatigue and weight loss are signs that prove the end of frailty cycle which also indicate elderliness has fallen on an advanced stage of frailty condition.[28]

Correlation Analysis between Demographic Characteristics and Frailty:-
Frailty is a common elderly syndrom that is characterized by a decrease of physiological as well as functional reserve on the entire multiorgan system which corresponds with age, that causes increase in vulnerability and worsening on health. According tp Fried et al. (2001) an individual can be considered frail if they meet three or more criteria which consists of weight loss, fatigue, weakness, low walking speed, and low physical activities; prefail if they meet only one or two criteria; robust if they do not meet any of the criteria.[29] On research conducted towards elderlies in the five districts in Malang City, the majority is found to be in the prefail category. Prefrail individuals are more likely to develop to become frail. They are even more likely to be ill, be hospitalized, or die, even though the risk is still lower than those who are frail. Most of prefail respondents suffer a form of weakness when asked to grip a hand-held dynamometer, an apparatus to measure grip strength. Frailty process starts by physiological changes due to age, diseases and or lack of activities, or poor nutritional intake. The proceeding process will result in the loss of body mucle mass, bone mass, inflammatory responses, as well as body response in maintaining homeostasis which makes grip strength diminishes.[26]

This research found no correlation between sex and frailty. Previous research suggests that females suffer more frailty than males due to females having fewer body mass index (BMI) and muscle strength. Other possible explanation is that females have longer life expectancy.[30] On research carried out by van Assen (2016), frailty is more commonly suffered by females because males have more average muscle mass, endocrine level, and higher hormonal activity which can protect them from frailty. This research does not proof that females tend to suffer frailty more than males due to the fact that field observation shows that female respondents encountered are more fit, are actively working out, and are routinely involved in elderly activities, resulting in the number of prefail elderlies are more than those who are frail.[31]

This research shows that age correlates significantly with frailty, most of the respondents aged 75 years or above shows positive result on the three Fried's criteria, which are fatigue, low physical activities, and weak grip strength. Referring to Heuberger's research, as an individual grows old, signs of inflammation marker and insulin resistence increase. Insulin resistence is identified as the main risk of age-related fat metabolic diseases.[10] Several research suggests that frailty level increase as an individual gets older.[5, 6, 7, 9, 32] Even as to the Canadian National Population Health Survey, frailty prevalence in regards to deficit accumulation, increases exponentially with age throughout adulthood, not just after the age of 65.[33]

Education level shows a correlation with frailty in this research. Most of the respondents with low education level experienced an increase in weakness, fatigue for the entire day, and have low physical activities. The higher education level an individual has, the more health-related information they receive.[34] An explanation between the different level of education level on frailty can be found in the factors that accelerate physical aging process, and what is also discovered to have a role in the relationship between education level as well as other medical characteristics, are materials, biomedics, behaviors, and psychosocial factors. Material deficiency, such as low income, is more commonly present on society with low education level which have a further effect on health for instance, little access to healthy foods and unhygienic living environment. Biomedical factors comprises of chronic diseases and biomarkers, good variance according to education level and weakness status, behavioral factors may also be important in explaining the correlation between education level and frailty because individuals with low education level generally have inadequately-healthy lifestyle. Psychosocial factors such as mental condition, for example depressions and control faith. As well as social condition, for example personal network characteristics influence to some degree because people with low education level are more exposed to environmental stress.[35] A

study conducted in Europe proves that frailty level is more prevalent in a society with low education level.[5] Other research mentions that low education level is a risk factor of frailty.[7, 10, 11].

This research shows that marital status correlates with frailty degree. Widow/widower repsondents are found to more frail when compared with respondents whose spouse are still alive. Most of the widow/widower respondents experience grip strength decrease, more often to feel fatigue, and shows low physical activities. This is also based on previous research that shows positive impact of marriage to disability level, vulnerability towards depressions and emotional problems. Widow/widower status is found to increase disability risks, while the health status of married individuals appears to be much better because they have fewer exposure to behavioral risks, also the fact that they have more economic resources and as well as psychological supports.[8] Frailty is also found little among people who are married on a research carried out by Runzer-Colmenares.[9]

Conclusion:-
Based on a research conducted towards elderlies in the five districts of Malang City, it can be concluded as follows:
1. Respondents characteristics shows that most of the respondents are female which make up 78,8%, aged 60-64,9 years which make up31,1%, are married which make up 48,2%, and have low education level which make up 62,2%.
2. Most of the researched respondents have prefrail degree that make up 46,4%, followed by frail degree that make up 35,6%, and robust that make up 18,0%.
3. Sex shows no correlation with frailty due to the females present in this research are mostly fit, actively working out, are routinely involved in elderly activities, therefore elderlies are found to be more prefrail than to be frail.
4. Age shows a correlation with frailty. The older an individual be, the more decreased their physiological functions, which results in frailty.
5. Marital status shows a correlation with frailty. Elderlies who are widow/widower are more likely to be frail than those whose spouse are still alive.
6. Education level shows a correlation with frailty. Elderlies with low education level are more likely to be frail that those having higher education level.

Bibliography:-
1. Yuliati, A., Baroya, N.Ririanty, M. Perbedaan Kualitas Hidup Lanjut usia yang Tinggal di Komunitas dengan di Pelayanan Sosial Usia Lanjut. E-Jurnal Pustaka Kesehatan, 2014, 2: 1.
2. Gede, I Dewa. Gambaran Perilaku Menggosok Gigi pada Siswa SD Kelas Satu dengan Karies Gigi di Wilayah Kerja Puskesmas Rendang Karangasem Bali Oktober 2014. Intisari Sains Medis, 2016, 6 (1): 23–33.
3. Pusat Promosi Kesehatan, Departemen Kesehatan RI, dan FKM UI. 2009. Promosi Kesehatan Komitmen Global dari Ottawa – Jakarta – Nairobi Menuju Rakyat Sehat. Jakarta: Pusat Promosi Kesehatan.
4. Pin Ng, T., et al. Frailty in Older Person: Multisystem Risk Factors and the Frailty Risk Index (FRI). Jamda, 2014, xxx: 1–8.
5. Etman, A., et al. Socio-demographic Determinants of Worsening in Frailty Among Community-dwelling Older People in 11 European Countries. J Epidemiol Community Health, 2012, 66: 1116–1121.
6. Gale, C. R., Cooper, C., dan Sayer, A. A. Prevalence of frailty and disability: Findings from the English Longitudinal Study of Ageing. Age and Ageing, 2015, 44: 162–165.
7. Castell, MV., et al. Frailty Prevalence and Slow Walking Speed in Personsage 65 and Older: Implications for Primary Care. Bio Med Central Family Practice, 2013, 14: 86.
8. Trevisan, C., et al. Marital Status and Frailty in Older People: Gender Differences in the Progetto Veneto Anziani Longitudinal Study. Journal of Women's Health, 2016, 0: 0.
9. Runzer-Colmenares, F. M., et al. Prevalence and Factors Associated with Frailty Among Peruvian Older Adults. Archives of Gerontology and Geriatrics, 2014, 58: 69–73.
10. Heuberger, R.A. The Frailty Syndrome: A Comprehensive Review. Journal of Nutrition in Gerontology and Geriatrics, 2011, 30: 315–368.
11. Jürschik, P., et al. Prevalence of Frailty and Factors Associated with Frailty in the Elderly Population of Lleida, Spain: the FRALLE Survey. Archives of Gerontology and Ge-riatrics, 2012, 55: 625–631.
12. Hutagalung, Raja Bongsu, and Novi Aisha. "Analisis Faktor Faktor yang Mempengaruhi Perilaku Konsumen terhadap Keputusan Menggunakan Dua Ponsel (GSM dan CDMA) pada Mahasiswa Departemen Manajemen Fakultas Ekonomi USU." *Jurnal Manajemen Bisnis* 1.3 (2008): 97-102.

13. Badan Pusat Statistik Kota Malang. 2016. Kota Malang dalam Angka. Malang: Badan Pusat Statistik Kota Malang.
14. Badan Pusat Statistik Jakarta Pusat , 2010. Statistik Indonesia Tahun 2010. Jakarta Pusat : Badan Pusat Statistik.
15. Novitaningtyas, Tri. 2014. Hubungan Karakteristik (Umur, Jenis Kelamin, Tingkat Pendidikan) dan Aktivitas Fisik dengan Tekanan Darah pada Lanjut usia di Kelurahan Makamhaji Kecamatan Kartasura Kabupaten Sukoharjo. Surakarta: Fakultas Ilmu Kesehatan Universitas Muhammadiyah Surakarta.
16. Majid, Yudi A. 2014. Pengaruh Akupresur terhadap Kualitas Tidur Lanjut usia di Balai Perlindungan Sosial Tresna Werdha Ciparay. Bandung: Fakultas Ilmu Keperawatan Universitas Padjajaran.
17. Perrig-Chiello P. dan Hutchison S. Health and Well-being in Old Age: The Pertinence of a Gender Mainstreaming Approach in Research. Gerontology, 2010, 56: 208–13.
18. Oksuzyan A., et al. Men: Good Health and High Mortality Sex Differences in Health and Aging. Aging Clin Exp Res, 2008, 20: 91–102.
19. Galdas P., Cheater F., dan Marshall P. Men and Health Help-seeking Behaviour: Literature Review. J Adv Nurs, 2005, 49: 616–23.
20. Bassil N., dan Morley J.E. Late-life Onset Hypogonadism: A Review. Clin Geriatr Med, 2010, 26: 197–222.
21. Owens IPF. Ecology and Evolution: Sex Differences in Mortality Rate. Science, 2002, 297: 2008–9.
22. Kirkwood T. Genetics of Age-Dependent Human Disease. Hazzard's Geriatric Medicine and Gerontology, 2009, 6 (2): 15–21.
23. Kurniasari, K dan Leonardi, T. Kualitas Perempuan Lanjut Usia yang Melajang. Jurnal Psikologi Pendidikan dan Perkembangan, 2013, 2 (3).Borras C, Sastre J, Garcia-Sala D, et al. Mitochon- dria from females exhibit higher antioxidant gene expression and lower oxidative damage than males. *Free Radic Biol Med.* 2003; 34:546-552.
24. Supramono dan Pamuji rahayu, Retno. 2012. Kajian Standar Kualitas Pendidikan di Taman Kanak-Kanak Kecamatan Bergas Kabupaten Semarang. Salatiga: Fakultas Keguruan dan Ilmu Pendidikan Universitas Kristen Satya Wacana.
25. Supriyatno. 2010. Analisis Implementasi Kebijakan Sekolah Gratis. Jakarta: Fakultas Ilmu Sosial dan Ilmu Politik Universitas Indonesia.
26. Gessal, J. dan Utari, W. Latihan Fisik pada Frailty Syndrome. Jurnal Biomedik, 2013, 5 (3): 131–141.
27. Carmo L.V.,et al. Avaliação do Nível de Fragilidade em Idosos Participantes de um Grupo de Convivência. Fisioter Pesqui, 2011, 18(1): 17–22.
28. Oliveira et al. Prevalence of frailty syndrome in old people in a hospital institution. Rev. Latino-Am. Enfermagem, 2013, 21(4):891–8.
29. Chen, X., et al. Frailty Syndrome: An Overview. Clinical Interventions in Aging, 2014, 9: 433–441.
30. Collard, Rose M., et al. Prevalence of Frailty in Community-Dwelling Older Persons: A Systematic Review. Journal of the American Geriatrics Society, 2012, 60.
31. Van Assen, Marcel., et al. Measuring frailty in Dutch community-dwelling older people:Reference values of the Tilburg Frailty Indicator (TFI). Archives of Gerontology and Geriatrics, 2016, 67: 120–129.
32. Moreira, V. G., dan Lourenco, R. A.. Prevalence and Factors Associated with Frailty in an Older Population from The City of Rio De Janeiro, Brazil: The FIBRA-RJ Study. Clinics, 2013, 68, 979–985.
33. Rockwood, K., Song, X., dan Mitnitski, A. Changes in Relative Fitness and Frailty Across the Adult Lifespan: Evidence from the Canadian National Population Health Survey. Canadian Medical Association Journal, 2011, 183: 487–494.
34. Mubarak, WahitIqbal, dkk. 2007. PromosiKesehatanSebuahPengantar Proses BelajarMengajardalamPendidikan. Yogyakarta: GrahaIlmu.
35. Hoogendijk, Emiel O. Explaining the Association Between Educational Level and Frailty in Older Adults: Result From a 13-Year Longitudinal Study in the Netherlands. Annals of Epidemiology, 2014, 24: 538–544.