Original Article

# Physical Activity And Nurses' Attribute Variables To Body Mass Index And Uric Acid

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**Abstract**

**Introduction:** Obesity among health workers hinder the effectiveness of health promotion, harm their health, and reduce productivity in the workplace.

**Objective:** The purpose of this study is to describe the attribute variables, daily activity patterns, BMI and uric acid levels in nurses.

**Methods:** The method in this study is a descriptive correlational using purposive sampling technique, amounting 50 respondents. International Physical Activity Questionnaire (IPAQ) was used for the physical activity data, BMI and checking uric acid levels.

**Results:** The results showed Obese I BMI (58%), Obese II BMI (42%), Prediabetes fasting blood sugar levels (28%), Diabetes (4%). Moderate physical activity patterns is 80% METs-mins/week. Analysis showed that there is a significant relationship between age and physical activity patterns (METs-mins/week) with p value of $0,02 < 0,05$. There is a significant relationship between marital status and physical activity patterns with p value of 0,005. There is also a significant relationship between chronic disease and uric acid levels with p value of $0,020 < 0,05$. There is no significant relationship between BMI and uric acid levels with physical activity patterns ($sig > 0,05$).

**Conclusion:** Obesity among professional nurses has negative implications for the capacity, success, follow-up and safety of health services and the health of these nurses. Nurses need to achieve and maintain a healthy body weight.

**Keywords :** gout, obesity, nurses, physical activity

## Introduction

Obesity is a chronic condition due to the accumulation of fat in the body which is very high. Obesity occurs because the intake of more calories than activities burn calories, so that excess calories accumulate in the form of fat. Obesity is ranked fifth as a global risk of death and the World Health Organization (WHO) estimates that 2.8 million adults will die each year due to obesity. About 2.8 million adults die each year related to being overweight and obese. Body mass index (BMI) or BMI is a value derived from a person's mass and height. BMI is defined as the body mass divided by height squared and is universally expressed in units of kg / m², which is the result of mass in kilograms and height in meters. Someone is said to be overweight or overweight if they get a BMI number between 25-29,9. He will be in the obese category if he gets a BMI number above 30.[1] Based on a survey

conducted in developed and developing countries, approximately 1.5 billion adults over 20 years of age are overweight (body mass index (BMI) 25-29.9 kg / m2). From this figure, more than 200 million men and nearly 300 million women are obese (BMI ≥ 30 kg / m2) (1). The obesity rate also continues to experience a significant increase in developing countries, one of which is Indonesia. Based on Riskesdas 2013 data, there was an increase in the prevalence of obesity in adult males by 7.8% in 2010 to 19.7% in 2013. In women, obesity increased by 15.5% in 2010 to 32.9 % in 2013.[2]

One of the metabolic disorders caused by obesity is the metabolism of uric acid. A study shows that hyperuricemia is common in people who are obese and suffer from metabolic syndrome.[3] Uric acid is an end product of purine metabolism in the blood. The source of uric acid in humans is through endogenous or exogenous processes. Endogenous processes occur naturally in the human body through de novo synthesis and the breakdown of nucleic acids, while exogenous processes come from the intake of foods containing purines. An epidemiological survey conducted in Bandungan, Central Java in collaboration with WHO-COPCORD on 4,683 samples aged 15-45 years found that the prevalence of gout in women was 11.7%.[4] Uric acid levels can be determined through blood tests and urine. Levels of blood uric acid to normal in men is 3,6 -8.2 mg / dL, whereas in females is 2.3 to 6.1 mg / dl.[5] Based on data from more than 14,000 people, the researchers calculated how many factors such as being overweight, following a heart-unhealthy diet, drinking alcohol, or taking diuretics contributed to high levels of uric acid (a precursor to uric acid). Gout is a medical condition in which there is a disruption in uric acid metabolism in the body. The result is an increase in uric acid levels in the body. Excess uric acid crystals will accumulate in body tissues and cause inflammation (inflammation) in the joints (arthritis). Serum uric acid is the end enzymatic product of purine metabolism in humans, and hyperuricemia is associated with MetS and may have similar pathophysiology.[6] However, the relationship between uric acid and MetS remains controversial and experience is limited to this association.

Physical activity (PA) and exercise are now considered the primary interventions for use in the primary and secondary prevention of chronic disease. Research shows that occupational factors contribute to obesity and physical inactivity. Adverse working conditions such as long working hours, high job demands, and exposure to a hostile work environment are significantly associated with obesity.[7] The work of nurses generally involves working long shifts and working hours, so often they will experience fatigue physically and mentally. Given the intense relationship between work and personal time, many workers experience serious difficulties in managing their time and taking care of themselves, which has dangerous consequences for their health and well-being.[8] The prevalence of obesity has important implications for the health of nurses, health professionals, the effectiveness of health promotion delivered by health professionals, and patient safety. Given the link between obesity and an increased risk of disease and injury, obesity among health professionals has the potential to harm their health and obese individuals may struggle with health problems associated with obesity, including fatigue, shortness of breath, or arthritis, which can reduce productivity in the workplace.[9] The capacity of the workforce can be reduced through increased absenteeism and premature labor discharge.[10]. The high prevalence of obesity among health workers should encourage policymakers and employers to provide solutions, such as support staff to maintain a healthy weight through workplace initiatives.[11] Investments in staff health will, in turn, benefit healthcare services in terms of continuity and high-quality patient care through positive impacts on productivity, retention, and absenteeism rates through increased morale, job

satisfaction, and well-being.[12]

The hospital which is the location of this research is one of the private hospitals in Bandar Lampung. In mid-2019 the hospital management held a Medical Check-Up for professionals, and data obtained were about 57.9% of the 269 people who were overweight and obese. Meanwhile, about 13% or 35 people experienced an increase in uric acid levels. The number of professional nurses in this hospital is 207 nurses and there are 53,1% are overweight and obese. The purpose of this study was to describe the attribute variables, daily activity patterns, BMI, and blood sugar levels in professional nurses. As well as finding out whether there is a relationship between attribute variables, activity patterns on BMI and blood sugar levels of professional nurses.

## Method

This study was used the design description correlation which was carried out on 50 nurses. Sampling was carried out using a purposive sampling technique. The population of respondents was adult female nurses who worked at the Bandar Lampung Adventist Hospital. The study was carried out after obtaining approval from the Health Research Ethics Committee Universitas Advent Indonesia No. 088 /KEPK-FIK.UNAI/EC/VII/20 and research permit from the Director of Bandar Lampung Adventist Hospital No. 22 6 / RSA-BL / VII / 2020. Univariate analysis was performed to determine the frequency and percentage of each variable. Bivariate analysis was performed using a correlation formula, namely Pearson r and Spearman rho. Data collection was carried out by measuring body weight and height to obtain BMI results. Respondents' physical activity information was measured using a structured interview method using the Short-Form version of the International Physical Activity Questionnaire (IPAQ-SF) guide which has been translated into Indonesian (Chan et al., 2017; Harikedua and Tono, 2012). The Short-Form (IPAQ-SF) version of the International Physical Activity Questionnaire Guide The questionnaire consists of 7 questions based on the physical activity performed by the respondent during the last 7 days. The results of the interview are then processed using the IPAQ scoring protocol guide with the help of IPAQ automatic reports so that physical activity data. IPAQ uses MET (metabolic equivalent of task) as units. To get the value of the levels of uric acid, the respondents are to fast for 10 hours starting from the evening, where the next morning made taking the blood with the blood sugar measuring device (Accu Check).

## Results

The distribution of respondent data based on age, marriage, contraception, chronic diseases, and family diseases can be seen in table 1.

**Table 1.** Distribution of Respondent Characteristics (N = 50)

| Variable | Category | Frequency | Percentage |
|----------|----------|-----------|------------|
| Age | 21 - 30 years | 5 | 10% |
| | 31 - 40 years | 23 | 46% |
| | 41 - 50 years | 19 | 38% |
| | > 51 years | 3 | 6% |
| Marital | Single | 7 | 14% |
| | Married | 43 | 86% |
| Contraception | No | 13 | 26% |
| | Sterile | 19 | 38% |

|  |  |  |  |  |
|---|---|---|---|---|
|  | Spiral | 8 | 16% |  |
|  | Calendar | 10 | 20% |  |
| Chronic Illness | Absent | 42 | 84% |  |
|  | Present | 8 | 16% |  |
| Family Diseases | Absent | 29 | 58% |  |
|  | Hypertension | 17 | 34% |  |
|  | DM | 4 | 8% |  |

The results of this study showed that most of the respondents were aged 31-40 years (46%), married marriage status (86%), sterile contraception (38%), chronic disease (16%), a family history of hypertension (34%) and DM (8%).

**Table 2.** Percentage of BMI, Uric Acid, METs

| Variable | Category | Frequency | Percentage |
|---|---|---|---|
| **BMI** |  |  |  |
| **<18.5** | Less | 0 | 0% |
| **18.5 - 22.9** | Normal | 0 | 0% |
| **23 - 24.9** | Overweight | 0 | 0% |
| **25 - 29.9** | Obese I | 29 | 58% |
| **> 30** | Obese II | 21 | 42% |
|  |  |  |  |
| **Uric acid** |  |  |  |
| **2,4 - 6** | Normal | 32 | 64% |
| **> 6** | High | 18 | 36% |
|  |  |  |  |
| **MET** |  |  |  |
| **<600** | Low | 4 | 8% |
| **600 - 1500** | Moderate | 40 | 80% |
| **> 1500** | High | 6 | 12% |

Table 2 shows that Obese I (58%) and (42%) Obese II, respondents who showed normal (64%) and high uric acid levels (36%) and who had METs values in moderate physical activity (80%).

**Table 3.** Age and MET

| Spearman rho | Variable | Mean | Standard Deviation | Sig | Correlation Coefficient |
|---|---|---|---|---|---|
|  | Age | 2.40 | .756 | 0, 0 22 | 0, 323 |
|  | MET | 1143.98 | 524,649 |  |  |

Table 3 shows that there is a significant relationship between age and activity patterns with a sig value of 0.022 <0.05. The correlation coefficient value of 0.323 shows a positive sign, which means that age and activity patterns have a direct relationship with a sufficiently close relation.

**Table 4.** Marital and MET

| Spearman rho | Variable | Mean | Standard Deviation | Sig | Correlation Coefficient |
|---|---|---|---|---|---|
|  | Marital | 1.86 | 351 | 0,005 | 0 , 391 |
|  | Physical Activity | 1143.98 | 524,649 |  |  |

Table 4 shows that there is a significant relationship between marital and activity patterns with a sig value of 0.005 <0.05. The correlation coefficient value of 0.391 shows a positive sign, which means that age and activity patterns have a unidirectional relationship with a

sufficiently close relation.

**Table 5.** Chronic Disease and Gout

| | Variable | Mean | Standard Deviation | Sig | Correlation Coefficient |
|---|---|---|---|---|---|
| *Spearman rho* | Chronic Illness | 1.16 | .370 | 0, 02 | 0, 328 |
| | Uric acid | 5.56 | 1,451 | | |

Table 5 shows that there is a significant relationship between chronic disease and gout with a significant value of 0.02 <0.05. The correlation coefficient value of 0.328 shows a positive sign, which means that chronic disease and gout have a unidirectional relationship with a sufficiently close relation.

**Table 6.** Correlations of Each Variable with BMI and Uric Acid

| | Variable | BMI | | Uric acid | |
|---|---|---|---|---|---|
| | | Correlation Coefficient | Sig (2-tailed) | Correlation Coefficient | Sig (2-tailed) |
| *Spearman rho* | Age | .000 | 0.998 | 0, 045 | 0, 756 |
| | Marital | .110 | 0.448 | 0, 136 | 0, 346 |
| | Contraception | .062 | 0.668 | 0, 186 | 0, 195 |
| | Chronic Illness | .255 | 0.074 | 0, 328 | 0 , 02 |
| | Family Diseases | .215 | 0.133 | 0, 208 | 0, 147 |

In table 6, there is a significant relationship between chronic disease and BMI and uric acid (sig <0, 05). Meanwhile, there was no significant relationship between contraception and family disease with BMI and uric acid (sig> 0.05).

**Table 7.** Relationship of Each Variable with Physical Activity

| | Variable | METs | |
|---|---|---|---|
| | | Correlation Coefficient | Sig (2-tailed) |
| *Spearman rho* | Age | .323 | 0.022 |
| | Marital | .391 | 0.005 |
| | Contraception | .212 | 0.139 |
| | Chronic Illness | .031 | 0.830 |
| | Family Diseases | .169 | 0.240 |

Table 7 shows that age, and marital status, have a significant relationship with activity patterns (sig <0.05). While variable contraception, chronic illnesses, and family illnesses no significant relationship with physical activity (sig> 0,05).

**Table 8.** The Relationship between Activity Patterns and BMI and Gout

| | | BMI | | Uric acid | |
|---|---|---|---|---|---|
| *Spearman Rho* | **METs** | Correlation Coefficient | Sig (2-tailed) | Correlation Coefficient | Sig (2-tailed) |
| | | 0, 235 | 0, 1 | 0, 261 | 0, 067 |

Table 8 shows that BMI and uric acid have no significant relationship with physical activity (sig > 0.05).

**Discussion**

From the results of the above research, it can be proven that Obese I (58%) and Obese II (42%), respondents who show prediabetes (28%) and diabetes (4%), and who have METs values in moderate physical activity (80%). According to research conducted (Nicola Dalbeth, 2015) how BMI modulates the relationship between a sweetened drink

with uric acid levels and the disease, it is said that it is possible for people with high BMI to get the uric acid disease.[13] Consistent with the serum urate results, it has been observed that intake of high sugar-sweetened beverages is associated with a ratio of the likelihood of developing the disease in people with a higher BMI (obesity), and not for people with normal BMI. In the study (Deni AC, 2018 ) the data showed that there was no significant relationship between physical activity and the incidence of obesity (p = 0.18).[14] Problem obesity does not directly increase the risk of gout. However, both do have a relationship that occurs, because of the metabolic syndrome process. Decreased daily energy expenditure may not be the main cause of obesity, but that doesn't mean PA or exercise doesn't play a role in weight management and energy balance. RP Shook (2015) conducted a study examining the relationship between physical activity, energy intake, appetite, and weight gain for one year in several individuals. He said that the limit for achieving energy balance is to take at least 7116 steps per day.[15]

In this study, it can also be proven that there is a significant relationship between individual age and activity patterns with a sig value of 0.022 <0.05. The correlation coefficient value of 0.323 shows a positive sign, which means that age and activity patterns have a direct relationship with a sufficiently close relationship. In general, the better a person is physically active, the better his physical abilities are. Physical activity reduces the risk of developing cardiovascular disease and metabolic through better control of blood pressure, cholesterol, and waist circumference in a way that depends on the dose: more activity led to the risk of cardiovascular disease and lower metabolism.[16] Earnest (2013) observed that women (45–75 years) in his study who exercised at 50% of the NIH recommendations also significantly improved their MS (metabolic syndrome) status.[16] It has been shown that BMI, not menopausal status, determines central adiposity in postmenopausal women. However, there is substantial evidence that perimenopause is associated with a more rapid increase in fat mass and redistribution of fat to the abdomen, resulting in a transition of ganoid to android pattern fat distribution and increased total body fat.[17] Then, it can be determined that there is a significant relationship between marital and activity patterns with a sig value of 0.005 <0.05. The correlation coefficient value of 0.391 shows a positive sign which means that age and activity patterns have a unidirectional relationship with a sufficiently close correlation. It has been discussed how when financial and family responsibilities increase, the priority of physical activity decreases.[18] A reduced level of physical activity can increase the risk of serious diseases, including metabolic-related diseases such as being overweight or obese.

In this study, it has also been proven that there is a significant relationship between chronic disease and gout with a sig value of 0.02 <0.05. Obesity is a major contributor to chronic disease. There are many links between obesity and chronic disease. There is a link between obesity and comorbidities such as chronic kidney disease which is directly related to obesity. It is also known that diabetes, hypertension, and cardiovascular disease (CVD) is closely related to chronic kidney disease.[19] These chronic diseases generally begin with the presence of excess body weight or obesity.[20] A number of population-based studies have shown an association between measures of obesity and the development and development of CKD (20). A high BMI rate is present and the progression of proteinuria in persons without kidney disease. A higher IMT also appears to be associated with the presence and development of a low estimated glomerular filtration rate (GFR) with a loss of GFR estimated to be faster over time.[21] Obesity causes kidney injury with a direct mechanism through the synthesis of disorders in various adipose tissue cytokines with nephrotoxic potential, and indirectly by triggering diabetes and hypertension, namely 2 conditions that rank among the strongest risk factors for CKD.[20] Several public studies also suggest a link between kidney disease and gout. Gout was independently associated with

the incidence of CKD in adults 65 years or older after controlling for common risk factors for CKD, including hypertension, diabetes, obesity, and others.[22]

In Table 6, it is shown that the chronic disease variable has a significant relationship with BMI and uric acid (sig <0,05). Meanwhile, there was no significant correlation between contraception and family disease with BMI and uric acid (sig>0.05). According to Karen Kearns (2014), overweight and obesity are the main contributors to various chronic diseases and carry a significant disease burden in the Republic of Ireland, especially among women.[23] A small reduction in BMI at the population level has the potential to lead to a substantial increase in the reduction of chronic disease prevalence. A performed study by Nurshad Ali (2018), currently shows a significant positive relationship between SUA and obesity among adults in Bangladesh.[24] Although not always linked to each other, increased serum uric acid has been shown associated with obesity in the adult population in many countries. And although a positive association between obesity and uric acid levels has been reported in several previous studies, the mechanism by which uric acid increases in obesity is not well explained. Obesity can be associated with uric acid levels which involve two factors: overproduction and poor kidney excretion. Meanwhile, there was no significant correlation between contraception and family disease with BMI and uric acid (sig> 0.05). The relationship between marital status with BMI and uric acid showed a significant number, namely 0.346 (sig> 0.05). According to research Umberson (2009) analyzing data from 1500 ACL respondents with observations at year 15, it is said that marriage is not significantly associated with BMI in women or men.[25]

Table 7 shows that age, and marital status, have a significant relationship with activity patterns (sig <0.05). In a two-year study by E. Hull (2010), results of the research show that marriage did not change physical activity significantly compared with individuals who remain single [$F_{(1,338)} = 0,38$, $P = 0.54$, $d = 0, 06$]. In contrast, PA was significantly lower [$F_{(1.517)} = 6.7$, $P = 0.01$, $d = 0.41$] after having a child, compared to individuals who remained childless.[26] Parenting appears to have a more pronounced effect on patterns of physical activity rather than marriage. Because generally, parents often admit feeling overwhelmed and exhausted by taking responsibility for a newborn baby or children. Higher levels of physical activity are associated with greater muscle strength, especially in women and those who are younger. This proves that there is a relationship between age and physical strength, especially in muscle strength, which results in high or low values of a person's physical activity. Meanwhile, there is no significant relationship between contraception, chronic disease, and family diseases with PA (sig> 0,05). Physical activity and exercise can be seen as medications for chronic diseases such as CDV or type 2 diabetes. Chronic disease is the leading cause of death globally. Regular physical activity can be both primary and secondary prevention.

Table 8 shows that BMI and uric acid have no significant relationship with activity patterns (sig > 0.05). Uric acid was significantly increased linearly with increasing BMI, and uric acid in obesity was significantly higher than in underweight. The prevalence of hyperuricemia remained about 2.98 times greater in overweight individuals and 5.96 times greater in the obese group than in underweight individuals. It has been shown that BMI is strongly associated with prevalent hyperuricemia and has health consequences in society. It is important to know considering that about 34% of Americans are overweight, about 20% are obese, and about 14% are obese at stage II or above.[27] Physical activity is one of the main factors targeted in the prevention and management of obesity and also produces various health benefits. According to Dal Lae Chin (2016), physical activity has great health benefits.[28] The Centers for Disease Control and Prevention (CDC) most of the nurses in the study did not perform the recommended amounts of physical activity. Only 41.3% met the recommended level for aerobic physical activity, which is lower than the 51.6%

prevalence among US adults.[29] These findings clearly demonstrate the need to motivate nurses to achieve regular physical activity during their leisure time. In Navajas-Romero's (2020) baseline estimate of the central variable research, the general sample of nursing professionals appears to have some problems in balancing their personal time and working time, with a mean score of only 0.5071 on a scale of 0 (poor WLB) to 1. (WLB is good). Moreover, the problem appears to be slightly more pressing among women (0.5067) than among men (0.5102).[30] Unlike other professionals, nurses offer an intangible service that is closely linked to the professional performing it. Good work and family conflict management will enhance the WLB of these professionals, which will have a positive effect on workers and organizations.[31]

## Conclusion

The results showed that Obese I, Obese, sugar content fasting blood Prediabetes, Diabetes and the results of moderate physical activity patterns are dominant METs-minutes / week. There is no significant relationship between BMI and uric acid with activity patterns. Give motivation to nurses in order to achieve and maintain a healthy weight by providing health examination, in particular, confirms that they handle weight, diet, and activities, and provide continuous support to nurses as they play an important role in service health and has an essential role, namely to carry out health promotion and primary prevention.

## Conflict of Interest Declaration

This research is independent of the conflict of interest of both individuals and organizations

## Funding

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