International Journal of Public Health Asia Pacific
*Open Access: e-Journal*
*ISSN: xxxx-xxxx (Online)*

# Health literacy and hypertension among middle and elderly aged population in Myanmar: A cross-sectional study

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## ABSTRACT

**Background:** Hypertension and cardiovascular diseases are highly prevalence and the leading causes of deaths in Myanmar. There are no previous studies that focus on health literacy and hypertension in Myanmar.

**Objectives:** This study aimed to identify the prevalence of hypertension and association between health literacy and hypertension among middle and elderly aged in Mandalay Region, Myanmar.

**Methods**: An analytical cross-sectional study was conducted among middle aged and elderly population in 3 townships of Mandalay Region, Myanmar. A multiple logistics regression was used to determine the association between hypertension and determinant factors after controlling the effects of co-variates presenting adjusted OR and 95% confidence interval.

**Results:** Of the total 410 respondents**,** the prevalence of hypertension was 21.95 %. Where, 39.02% had inadequate health literacy level of hypertension. The factors significantly associated with hypertension were inadequate and problematic health literacy (AOR= 2.74, 95%CI: 1.43 - 5.21), age 50-59 years (AOR= 3.70, 95%CI: 1.71 -7.97), ≥ 60 (AOR= 4.48, 95%CI: 2.22 - 9.04), unemployed (AOR= 2.40, 95%CI: 1.23 - 4.68), overweight (AOR= 3.85, 95%CI: 1.84 – 8.07), and obesity (AOR= 6.00, 95%CI: 2.75 - 13.08), salty foods consumption (AOR= 3.12, 95%CI: 1.68 – 5.79), sweet fruits consumption (AOR= 4.00, 95%CI: 1.95 – 8.19), consuming food cooked with sesame or peanut oil (AOR= 2.03, 95%CI: 1.06 – 3.87) and alcohol consumption (AOR= 7.43, 95%CI: 3.56 - 15.49), no depression (CESD < 16) (AOR= 2.65, 95%CI: 1.37 – 5.09).

**Conclusion:** The concerned organizations should provide health literacy to address increasing pattern of hypertension and prevention and health promotion activities should be encouraged. Further studies with operational research or longitudinal study design are recommended to provide the better understanding of the relationship between health literacy, other factors, and hypertension among middle and elderly aged.

**Keywords:** Health literacy, Hypertension, Myanmar

## 1. Introduction

Hypertension is called a silent killer [1]. Additionally, it is a prime public health trouble worldwide [2]. In 2021, it was estimated that 1.28 billion adults from 30-79 years age have hypertension. Among them, two thirds are residing in low-and middle-income countries, however total 46% of adults are unaware about their condition [3]. It has been recognized as major risk for increasing non-communicable diseases (NCDs) and total 38 million people die from the main NCDs, these are almost 65 % of all deaths in every year [4].

Hypertension and cardiovascular diseases are the highly prevalence and the leading causes of deaths in Myanmar [2]. One of the National Survey in Myanmar showed that 59% of death rate of Myanmar was related with non-communicable diseases [5]. The increasing rate of hypertension in Myanmar leads to the high incidence of non-communicable diseases and challenging public health system of Myanmar [6].

Health literacy is connected to the individual' level in accessing, understanding, appraising and applying on information related with health in their daily life course. And it is regarding with health care, disease prevention and health promotion to improve quality of life during their life course [7]. It is not only vital for health but also vital for socioeconomic improvement because limited health literacy can cause the high health care expenditure [8].

There were some Myanmar studies regarding hypertension [9-10]. These studies were identified changes in prevalence, awareness, treatment and control of hypertension and the prevalence and its determinants of hypertension. And one previous study done on health literacy with NCDs [8] . However, there were no previous studies focused on health literacy and hypertension in Myanmar. The purpose of selecting Mandalay Region for this study consists of the following reasons: it is the second largest city and one of the central zones of Myanmar. Moreover, most of the people living in Mandalay region are Burmese and their cooking nature is using salty and oil a lot more than other ethnics groups of Myanmar.

Hence, this study focused to find the association between health literacy level and hypertension among middle and elderly aged population in Mandalay Region, Myanmar. It will also attempt to examine knowledge and attitude on hypertension, physical and mental health status and socio-demographic factors among middle and elderly population. The findings may further help in formulation of the

specific measures to reduce hypertension among middle and elderly aged.

## 2. Methods

### 2.1 Study Population

A cross-sectional analytical study was conducted between August-September, 2022. The study population was middle and elderly aged population in Mandalay Region, Myanmar. The sample size was calculated by using the sample size estimation formula for the logistic regression analysis of Hsieh [11]. In the formula, the researcher put P0 = 0.41, P1 = 0.74 and B = 35.01% which were calculated from previous study and added 4% to cover the non-respond [12]. The researcher calculated the sample size from different VIF to estimate the sample of the study. Finally, the estimated sample size was 410 and the respondents were recruited from 3 townships of Mandalay Region, by using multistage sampling technique.

The inclusion criteria of the respondents were those who were living in the study area for at least one year, age (40 years to elderly years) and willing to participate in the study. The exclusion criteria were self-reported use of antihypertensive medications before the six months of during the time of interview, suffering from serious health problem physically and in pregnant and individuals with mental disabilities. The participants were requested to respond a structured questionnaire followed by interview, blood pressure and anthropometric measurements by three well-trained health staff interviewers. Ethical clearance and approval were taken from the office of the Khon Kaen University Ethics Committee in Human Research (Reference no. HE652125). Written consent was obtained from all participants prior to participation.

### 2.2 Data Collection

A structured questionnaire was developed based on the research questions and relevant literatures. The questionnaire consisted of nine parts: Socio-demographic characteristics; Behavior factors; Physical Health Status, Mental Health Status, Health Literacy Index; Knowledge on Hypertension, Attitude on Hypertension, Blood pressure Index and Body Mass Index. The questionnaire was tested for reliability by calculating Cronbach's alpha among 30 participants from 3 townships. Moreover, the questionnaire had been verified for content validation by experts and revised to improve its validity. The Cronbach's alpha coefficient were 0.85 for health literacy, 0.78 for attitude and 0.67 for knowledge questions. Hypertension health literacy was measured by Asia Questionnaires that is standardized by the HLS Asia consortium 2013 was upgraded with hypertension information [8]. The questionnaire was composed of 24 items

related to participant's health literacy as per level of difficulties such as very difficult, difficult, fairly easy and very easy. After summing the total scores, the health literacy will be classified into 4 levels, >80% as "excellent", 70-79% as "adequate", 60-69% as "problematic" and <60% as "inadequate". Knowledge on hypertension was measured by hypertension knowledge level scale questionnaire and included total 10 items. It was ranged from 0-10 and converted into percentage. Attitude on hypertension was measured by attitude level scale questionnaire and consisted of 9 statements. The attitude scored had a range of 0 – 4 and the scores was converted into percentage. Using the standard criteria stand cut off point.

Measurement of outcome and anthropometric: Blood pressure of the participants were measured 5 to 10 minutes apart on the right arm by using the standard mercury sphygmomanometer according to the Seventh Report of the Joint National Committee guideline [13]. Body weight and high of the participants will be done by using the digital bathroom scale and the tape that shows both Metric and British system of length on standing position, not wearing shoes and wearing light weight clothes. Hypertension referred to the Systolic blood pressure of individual is more than and equal to 140 mm Hg or DBP 90 (BP ≥140 / ≥ 90 mm Hg) [3].

### 2.3 Statistical Analysis

The data was recorded into MS Excel and imported into STATA (Version 13, Stata Corporation, College Station TX) for analysis. The categorical variables were described as frequency and percentage and continuous variables were computed as mean (SD) and median (min; max). In bivariate analysis (simple logistic regression), the crude odds ratio (COR), 95% CI and p value of the independent variables were obtained. From bivariate analysis, factors with p-value ≤ 0.25 were selected and proceeded for the multivariable analysis. Results in the final model defined the magnitude of association of independent variables and hypertension with adjusted odds ratio (adjusted OR) and 95% CI.

## 3. Results

### 3.1 Prevalence of hypertension and baseline characteristic of middle and elderly aged population in Mandalay Region, Myanmar

The prevalence of hypertension in this study was found to be 90 (21.95%). The mean of systolic blood pressure and diastolic blood pressure were 120.76 mmHg ±19.20SD and 77.75 while the mean of diastolic blood pressure was 77.75 ±10.41SD respectively.

Among the total, nearly half of them were between 40-49 years and mean age was 53.65 years. 71.46% were married and only 13.17%

had completed high school. 19.51% of the participants were unemployed. In body mass index, 22.68% was living with obesity and 21.95% participants were obesity. The mean of body mass index was 22.51622 ±8.076 SD and the minimum and maximum were15.28 and 31.47 (Table 1).

Table 1: Baseline characteristics and prevalence of hypertension of the participants in Mandalay Region (n=410)

| Factors | Number (n) | Percent (%) |
|---|---|---|
| **Age (years)** | | |
| 40-49 | 201 | 49.02 |
| 50-59 | 85 | 20.73 |
| 60 - 69 | 79 | 19.27 |
| ≥ 70 | 45 | 10.98 |
| **Gender** | | |
| Male | 186 | 45.37 |
| Female | 224 | 54.63 |
| **Marital Status** | | |
| Single | 45 | 10.98 |
| Married | 293 | 71.46 |
| Divorce/Widow/Separate | 72 | 7.56 |
| **Education** | | |
| No education | 15 | 3.66 |
| Primary school | 185 | 45.12 |
| Middle school | 104 | 25.37 |
| High school | 54 | 13.17 |
| Bachelor degree and above | 52 | 12.68 |
| **Occupation** | | |
| Employed | 330 | 80.49 |
| Unemployed | 80 | 19.51 |
| **Body mass index** | | |
| Underweight and Normal weight | 227 | 55.37 |
| Overweight | 93 | 22.68 |
| Obesity | 90 | 21.95 |
| Mean (SD), Median (Min: Max) | 22.51622 (±8.076) | 22.53 (15.28:31.47) |
| **Hypertension** | | |
| No | 320 | 78.05 |
| Yes | 90 | 21.95 |
| **Systolic blood pressure (SBP)** | | |
| Mean (S.D.), Median (Min: Max) | 120.76 (±19.20) | 120 (89: 230) |
| **Diastolic blood pressure (DBP)** | | |
| Mean (S.D.), Median (Min: Max) | 77.75 (±10.41) | 80 (54: 110) |

### 3.2 Behavioral and other related factors of the participants

In behavior factors, nearly one third of the participants consumed salty food more than five days per week, one fourth of the participants consumed the sweet fruits more than five days per week and 46.34% of the participants cooked with sesame or peanut oil ≥ 5 days per week. Among the total, 22.20% were current smoker, 19.46 % were current alcohol consumption and 19.46 % were current betel chewing. More than three third of the participants had inadequate health literacy

39.02%. One third of the participants have high level of knowledge and 21.95% have poor knowledge on hypertension. Among the participants 67.32 % of them had moderate stress and 40.49 % of the participants were depressive (Table 2).

Table 2: Behavioral, health status, knowledge and health literacy level of the participants in Mandalay Region (n=410)

| Factors | Number (n) | Percent (%) |
|---|---|---|
| **Frequency of salty food consumed per week (days)** | | |
| <5 | 270 | 65.85 |
| ≥5 | 140 | 34.15 |
| **Frequency of sweet fruits consumed per week (days)** | | |
| <5 | 301 | 73.41 |
| ≥5 | 109 | 26.59 |
| **Frequency of food cooked with sesame or peanut oil consumed per week (days)** | | |
| <5 | 220 | 53.66 |
| > 5 | 190 | 46.34 |
| **Smoking status** | | |
| Never | 267 | 65.12 |
| Former | 52 | 12.68 |
| Current | 91 | 22.20 |
| **Alcohol consumption** | | |
| Never | 294 | 71.71 |
| Former | 60 | 14.63 |
| Current | 56 | 13.66 |
| **Betel chewing** | | |
| Never | 269 | 66.26 |
| Former | 58 | 14.29 |
| Current | 79 | 19.46 |
| **Stress status** | | |
| Mild (1-13) | 110 | 26.83 |
| Moderate (14-26) | 276 | 67.32 |
| Severe (27-40) | 24 | 5.85 |
| Mean (S.D.), Median (Min: Max) | 17.01±5.16 | 17 (6: 32) |
| **Depression score (CESD scale)** | | |
| No depression (CESD < 16) | 244 | 59.51 |
| Depressive (CESD ≥ 16) | 166 | 40.49 |
| Mean (± SD), Median (min: max) | 16.21 ±10.35 | 12.5(0: 46) |
| **Knowledge level on hypertension** | | |
| Poor <60% | 90 | 21.95 |
| Average 60-79% | 173 | 42.20 |
| High ≥80% | 147 | 35.85 |
| Mean (± SD), Median (min: max) | 67.76 ± 19.31 | 70 (10: 100) |
| **Hypertension health Literacy** | | |
| Inadequate | 160 | 39.02 |
| Problematic | 86 | 20.98 |
| Adequate | 94 | 22.93 |
| Excellent | 70 | 17.07 |
| Mean (± SD), Median (min: max) | 67.41±13.96 | 66.66 (29.16:100) |

### 3.3 Factors associated with hypertension

Our multivariable analysis for associated factors of hypertension were identified by using the multiple logistics regression. The factors significantly associated with hypertension were age 50-59 years and ≥ 60

(AOR= 3.70, 95%CI: 1.71 -7.97) and (AOR= 4.48, 95%CI: 2.22 - 9.04), unemployed (AOR= 2.40, 95%CI: 1.23 - 4.68), overweight (AOR= 1.80, 95%CI: 1.84 – 8.07), obesity (AOR= 6.00, 95%CI: 2.75 - 13.08), salty food consumption ≥ 5 per week (AOR= 3.12, 95%CI: 1.68 – 5.79), sweet fruits consumption ≥ 5 per week (AOR= 4.00, 95%CI: 1.95 – 8.19), consumption of food cooked with sesame oil or peanut oil ≥ 5 per week (AOR= 2.03, 95%CI 1.06- 3.87) and former and current alcohol consumption (AOR= 7.43, 95%CI: 3.56 - 15.49), depression status (< 16) (AOR= 2.65, 95%CI: 1.37 – 5.09) and having inadequate and problematic health literacy level (AOR= 2.74, 95%CI: 1.43 - 5.21) (Table 3).

Table 3: Factors associated with hypertension (Multivariate analysis):

| Factors | Number | % Hypertension | COR | AOR | 95%CI | P-value |
|---|---|---|---|---|---|---|
| **Age (years)** | | | | | | <0.001 |
| 0-49 | 201 | 9.95 | 1 | 1 | 1 | |
| 50-59 | 85 | 29.41 | 3.77 | 3.70 | 1.71 -7.97 | |
| ≥ 60 | 124 | 36.29 | 5.16 | 4.48 | 2.22 - 9.04 | |
| **Occupation** | | | | | 1 | 0.010 |
| Employed | 330 | 17.58 | 1 | 1 | | |
| Unemployed | 80 | 40.00 | 1.33 | 2.40 | 1.23 - 4.68 | |
| **BMI Status** | | | | | | <0.001 |
| Under& Normal weight | 200 | 15.50 | 1 | 1 | 1 | |
| Overweight | 113 | 24.78 | 1.80 | 3.85 | 1.84 - 8.07 | |
| Obesity | 97 | 31.96 | 2.56 | 6.00 | 2.75-13.08 | |
| **Salty foods consumed per week (days)** | | | | | | <0.001 |
| <5 | 270 | 15.93 | 1 | 1 | 1 | |
| >5 | 140 | 33.57 | 2.67 | 3.12 | 1.68-5.79 | |
| **Sweet fruits consumed per week (days)** | | | | | | <0.00 |
| <5 | 301 | 17.94 | 1 | 1 | 1 | 1 |
| ≥5 | 109 | 33.03 | 2.26 | 4.00 | 1.95- 8.19 | |
| **Food cooked with sesame or peanut oil consumed per week (days)** | | | | | | 0.031 |
| <5 | 220 | 18.18 | 1 | 1 | 1 | |
| ≥ 5 | 190 | 26.32 | 1.61 | 2.03 | 1.06 - 3.87 | |
| **Alcohol consumption** | | | | | | <0.001 |
| Never | 294 | 17.69 | 1 | 1 | 1 | |
| Former and current | 116 | 32.76 | 2.27 | 7.43 | 3.56 -15.49 | |
| **Depression score (CESD scale)** | | | | | | 0.004 |
| Yes (CES-D ≥ 16) | 166 | 15.06 | 1 | 1 | 1 | |
| No (CES-D <16) | 244 | 26.64 | 2.04 | 2.65 | 1.37- 5.09 | |
| **Health literacy index** | | | | | | 0.002 |
| Adequate& Excellent | 164 | 14.63 | 1 | 1 | 1 | |
| Inadequate & Problematic | 86 | 27.91 | 2.08 | 2.74 | 1.43 - 5.21 | |

Notes: 1: reference, Abbreviations: COR, crude odds ratio; AOR, adjusted odds ratio; CI, confidence interval; CES-D, Center for Epidemiologic Studies Depression Scale.

**4. Discussion**

The overall prevalence of hypertension was 21.95%, 26.34% in men and 18.30 % in women. The prevalence of hypertension was lower than the result obtained from the study in Myanmar that used nationwide survey data 2009 (30%, 30.1% in male and 29.8% in female) [10]. It might be probably due to exclusion criteria of current study, definition of hypertension, population different, age different and other variations. After controlling the confounding factors with backward elimination multivariate analysis, age was found significantly associated with hypertension which is consistent with several studies [14-15]. Aging and hypertension are related to changes arterial and arteriolar stiffness, which lead to the development of hypertension [16].The participants who were unemployed had 2.40 times more chance to be hypertension than the participants who were employed. This result agreed with the study conducted in Bangladesh [15] and Eastern Ethiopia [17]. The reasons behind this may be due to the participants in current study are middle and elderly aged and they might be lack of physical labor, outdoor activities and mobility.

The current study revealed that overweight was 3.85 times and obesity was 6.00 times likely to be increased the risk of hypertension than under and normal weight. One previous study demonstrated that obesity was 2.05 times more likely to be hypertension compared with normal [18]. It could be explained that the people in middle and elderly aged are less capable of engaging in physical activity and not willing to reduce body weight and could not effort to do. Our finding of salty food consumption as determinant of hypertension supported with previous study from Myanmar in which hypertension was significant associated with intake of various salty food [19]. However, different with the finding from Ethiopia [20]. It could be explained due to different in geographical region, using amount of salt, eating habits and other confounding factors.

In this study, sweet fruit consumption was significantly associated with hypertension. However, one prospective study reported different findings of sweet fruits and hypertension [21]. It could be explained the total consuming amounts and analysis design. The participants who consumed cooked food with sesame or peanut oil 5-7 days per week were 2.03 times more likely to be hypertension than who consumed < 5 days per week. Though, one previous study conducted in Myanmar found that using sesame oil in cooking was lower odd for hypertension [10]. The possible explanation for this finding might

be due to the different in setting places and using amount of oil. An association between alcohol drinking and hypertension was found. The participants who were current and former drinker were 7.43 times more likely to be hypertension than who were never drinker. This result was supported by studies carried out in Ethiopia [22] and India [23], in which reported that alcohol drinking was positively associated with hypertension.

In the prospective longitudinal study found that depression was associated with a 30% increased odds of hypertension [24]. Surprising, in the present study depression was a negative associated with hypertension. It might be explained due to the differences in study design, definition of depression and other factors. For the main interest of this study, the participants who had inadequate and problematic health literacy indices were 2.74 times more likely to be hypertension compared who had adequate and excellent health literacy. There was a significant correlation between the blood pressure knowledge and the mean score of health literacy [25]. The study done in Brazil observed that the high percentage of people with hypertension have inadequate level of health literacy [26]. Consistent with existing study in Hispanics showed that adequate health literacy was associated with a high adherence to antihypertensive medications [27]. This potential explanation is that the participants with inadequate hypertension health literacy may be more probable to comprise in risky health behaviors and less likely to engage in health-promoting behaviors, may have limited access or ability to understand and use health information related with hypertension.

Our study has several limitations. First, the study was a cross-sectional study; it does not allow establishing the causality of associations between exposure and outcome. Also, since, it was dependent on the participants' answers to the structured questionnaires. Therefore, memory recalling and interviewer relationship bias could not be excluded. Despite thesis limitation, to the best of our knowledge, this study is the first report on finding the association between health literacy and hypertension among middle and elderly population in Myanmar. Therefore, this research can be a reference for similar studies which will be performed in different part of Myanmar and other countries.

## 5. Conclusion

Our study found that more than one third of hypertensive respondents had inadequate health literacy on hypertension and only 22.93% had sufficient. Thus, the concerned agencies should provide education for increasing hypertension health literacy such as preventive information and health promotion

activities among the middle and elderly aged people. Age is positively associated with hypertension. Therefore, primary prevention activities should focus on elder age group population. Consumption of salty foods, sweet fruits, food cooked with sesame or peanut oil and alcohol were associated with hypertension. Hence, the government should promote to reduce consuming of sweet, oily, salty foods and alcohol drinking. Moreover, lifestyle and social behavior change programs should be implemented to reduce overweight and obesity among middle and elderly aged population.

**Acknowledgement**

Authors would like to express their sincere appreciation to all the participants, village and ward administers, community leaders and health staffs of Mandalay region, Myanmar to allow data collection and for their valuable information, supports and participation in this study. Moreover, would like to special thanks to the Faculty of Public Health, Khon Kaen University, Thailand for the financial and technical support.

**Conflicts of Interest**

The authors proclaim no struggle of interest

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