



## The Relationship Between Smartphone Addiction And Forward Head Posture In Junior High School Students In North Denpasar

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### ABSTRACT

**Background:** Nowadays, the smartphone has become an important requirement. The number of smartphone users and the duration of smartphone use is increasing rapidly, and the side effects can be detrimental one of them is forward head posture. The prevalence of forward head posture is greater women (24.1%) than men (9.1%).

**Methods:** This study was an analytical observational study with a cross-sectional design. This research was conducted in April 2019 in SMP Negeri 2 Denpasar and SMP Negeri 4 Denpasar and including 56 samples, who were recruited through simple random sampling. Variables studied are smartphone addiction was measured using the Smartphone Addiction Scale questionnaire, and forward head posture was measured by measuring craniovertebral angles. Data analysis was done using the Chi-Square test.

**Result:** Based on this study, smartphone addiction was related to forward head posture. The research shows that as many as 45 samples had Smartphone Addiction (80.35%) while those who had forward head posture were 29 samples (51.78%).

**Conclusion :** Ignorance of how to sort and choose the effects of globalization, especially smartphone use, which can lead to posture disorders. The factor recognized factors for the occurrences of the forward head posture the lack of education about ergonomic positions when using a smartphone. Parents are advised to set the right smartphone usage for children as early as possible.

**Keywords:** Ergonomic, Forward Head Posture, Junior High School Students, North Denpasar, Smartphone Addiction.

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## Introduction

A smartphone is an electronic device in which there is a cellphone function as a communication tool that has various application features that can be installed by all users.<sup>1</sup> Every year the number of smartphone users in the world is increasing. Statista's online statistics institute estimates in 2019 smartphone users will grow around 2.5 billion from 2.1 billion in 2016. The number of smartphone users in China as the most populated country in the world expected to grow to nearly 675 million by 2019, an increase of almost 20% from 2016. About half of China's population is projected to use smartphones by 2020. The United States is an important market in industrial smartphones, with smartphone users around 223 million in 2017, In 2019 the number of smartphone users in the United States is estimated to increase about 10% to 247.5 million. More than 36% of the world's population is projected to use smartphones in 2018.<sup>2</sup>

Indonesia is "the sleeping digital technology giant of Asia", due to Indonesia's population of 250 million. Indonesian smartphone users are also growing rapidly. Emarketer, the digital marketing research agency, estimates that in 2018, active smartphone users in Indonesia there will be more than 100 million about 40% of the population. According to Kominfo,<sup>2</sup> with such a large number, Indonesia will become the country with the fourth largest active smartphone users in the world after China, India, and the United States. The use of smartphones has a positive impact on various aspects of human life, starting from the fields of economics, education, health, and social life. Smartphones are also slowly changing norms, culture, and behavior. However, despite that, the excessive use of smartphones can cause addiction.<sup>3</sup>

In Indonesia smartphone users spend an average of 5.5 hours per day on their smartphones, not only for online social media activities but also other activities such as recording something, playing, and watching entertainment.<sup>4</sup> Smartphone users usually bow their heads to look down at the screen and keep

their head not in an ergonomic position for long periods.<sup>5</sup>

The body position of smartphone users is often in the forward head posture. That position is a condition in which the vertebral bones form a forward curve so that the position of the head tends to be in a forward position to maintain the balance of the body. It is also described as the anteriore position of the head that nears the vertical line from the center of gravity.<sup>6</sup> Forward head posture is usually found in elderly with impaired spinal postures such as kyphosis and scoliosis. With the increasing popularity of gadgets such as laptops and smartphones, adolescents are also at risk of developing forward head posture.<sup>7</sup>

Forward head posture for long periods can cause musculoskeletal disorders, such as upper crossed syndrome, and trigger the shortening of the muscles around the atlantooccipital articulation and excessive straining in the muscles around the joints, causing chronic neck pain.<sup>8</sup> In a high school in Probolinggo, 58.2% of adolescents experienced neck pain when using a smartphone.<sup>9</sup> Forward head posture affects not only the neck but also the thoracic spine and shoulder joints, which can cause imbalances in the musculoskeletal system. The prevalence of forward head posture is 66% in the age range of 20-30 years,<sup>6</sup> and is greater women (24.1%) than men (9.1%).<sup>10</sup>

Individuals who minimize forward head posture can improve their balance of health status.<sup>11</sup> Forward head posture causes muscle activity in the trapezius area to be higher compared to a neutral head posture. Additionally, forward head influences the range of motion in the cervical spine; the greater the angle of the forward head posture, the less movement the cervical spine make.<sup>12</sup> Forward head posture is closely related to decreased respiratory muscle strength in patients, which could affect the ability to breathe and reduce lung capacity by approximately 30%.<sup>13</sup> Based on some data regarding the negative impact of smartphone addiction on health, the authors wanted to examine the relationship between smartphone addiction and forward head posture in junior high school students in North Denpasar.

## Methods

This study was an analytical observational study with a cross-sectional design that aimed to determine the relationship between smartphone addiction and forward head posture in junior high school students in North Denpasar. This research was conducted in April 2019 in SMP Negeri 2 Denpasar and SMP Negeri 4 Denpasar. The sample in this study were 56 junior high school students from SMP Negeri 2 Denpasar and SMP Negeri 4 Denpasar who were recruited through simple random sampling. The inclusion criteria of this study were subjects who were willing to be a research sample by filling out and signing the informed consent, aged 14-16 years, and actively using a smartphone. The exclusion criteria were subjects who had a clavicular, cervical, or vertebral fracture in the last two months, and subjects who had a shoulder, neck, or back muscle injury last month. The independent variable in this study was smartphone addiction, the dependent variable was forward head posture, and the control variable was age. Age was determined based on data on the Student Card of each subject.

The study procedure commenced by gaining permission to carry out the study at the research locations. This was followed by the signing of informed consent by the subject, which contained a statement that the subject was willing to be the subject of this study until the end. The researcher provided the subjects with information regarding the study objectives, benefits, and procedure, and took measurements to include or exclude the subjects. After the minimum number of subjects were fulfilled, the researcher measured smartphone addiction using the Smartphone Addiction Scale questionnaire.<sup>3</sup> After this, forward head posture was measured by measuring the craniovertebral angle.<sup>14</sup>

Data obtained from the Smartphone Addiction Scale questionnaire is categorical ordinal whereas Forward Head Posture measurements are categorical ordinal. Data from the overall results of these measurements were processed statistically in software SPSS edition 20. Data analysis in the form of univariate tests was done to find out the

description of each variable, and bivariate test with Chi-Square analysis was carried out to determine whether or not there was a relationship between the independent variable and the dependent variable. The level of significance used was 95%, which means  $\alpha=0.05$ . The value of  $p<\alpha$  indicates there is a relationship between smartphone addiction and forward head posture in junior high school students in North Denpasar. Dated April 8, 2019 Research Ethics Commission of the Faculty of Medicine, Udayana University / RSUP Sanglah Denpasar.

## Result

The number of samples that met the inclusion criteria and exclusion criteria were 56 people. Descriptions of sample characteristics based on age, gender, smartphone addiction, and forward head posture can be seen in the following table.

Table 1. Data distribution according to age

Characteristic	Mean $\pm$ Standard Deviation
Age	14.44 $\pm$ 0.50

Table 1 shows that 56 students from SMP Negeri 2 Denpasar and SMP Negeri 4 Denpasar have a mean age and standard deviation of 14.44  $\pm$  0.50.

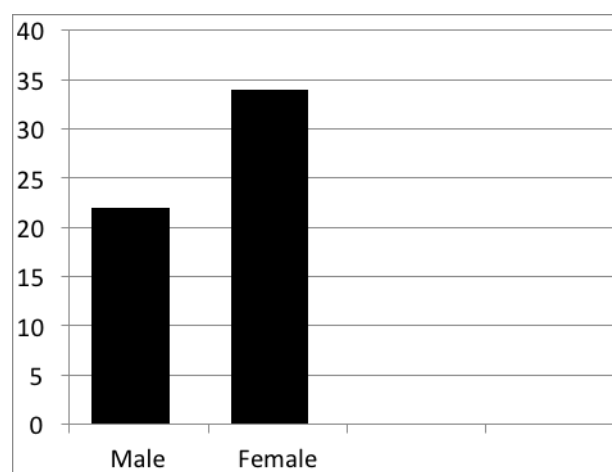


Figure 1. Frequency distribution characteristics based on gender

Based on Figure 1 above, shows that sample of male were 22 samples (39.28%) and female were 34 samples (60.72%).

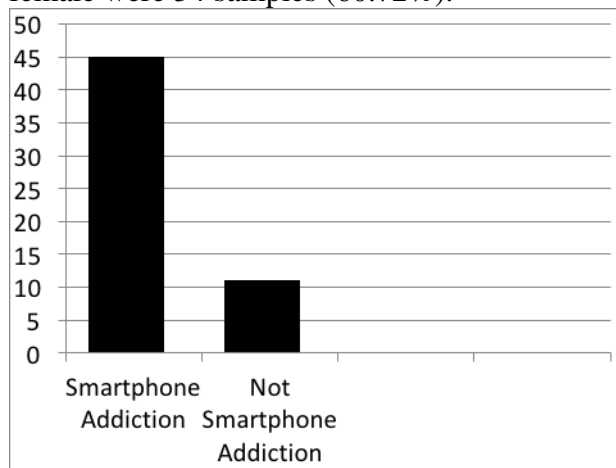


Figure 2. Frequency distribution characteristics based on smartphone addiction

Based on Figure 2 above shows that as many as 45 samples had Smartphone Addiction (80.35%) while those who hadn't Smartphone Addiction were 11 samples (19.65%).

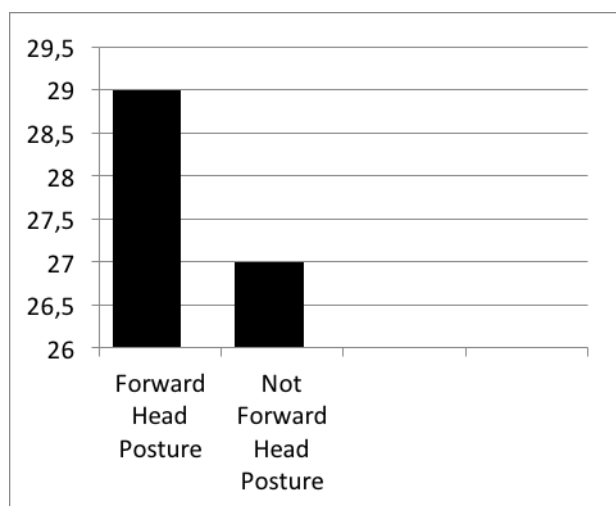


Figure 3. Frequency distribution characteristics based on forward head posture

Based on Figure 3 above shows that as many as 29 samples had Forward Head Posture (51.78%) while those who hadn't Forward Head Posture were 27 samples (48.22%).

From the output data above, it is known that the study data were obtained from 56 subjects. Hypothesis testing was done using the chi-square test, which is a parametric test conducted to determine the relationship between smartphone addiction and

forward head posture. Based on the results of the chi-square test analysis, the probability value obtained was  $p = 0.037$  ( $p = < 0.05$ ). This shows that there is a significant relationship between smartphone addiction and forward head posture.

## Discussion

Based on the results of the data analysis, it can be concluded that there is a relationship between smartphone addiction and forward head posture on junior high school students in North Denpasar. This study can be an evaluation of how to sort and choose the effects of globalization, especially smartphone use, which can lead to posture disorders. Parents are advised to set the right smartphone usage for children as early as possible. This study also provides education to minimize forward head posture to children who have been indicated with forward head posture by doing chin tuck exercise, and by educating about ergonomic positions when using a smartphone. This research provides scientific data so that it can support further research. Researchers who want to continue this study can control the attitudes and position of students while learning for more optimal results.

## Conclusions

Based on the results of the data analysis, it can be concluded that there is a relationship between smartphone addiction and forward head posture on junior high school students in North Denpasar. This study can be an evaluation of how to sort and choose the effects of globalization, especially smartphone use, which can lead to posture disorders. Parents are advised to set the right smartphone usage for children as early as possible. This study also provides education to minimize forward head posture to children who have been indicated with forward head posture by doing chin tuck exercise, and by educating about ergonomic positions when using a smartphone. This research provides scientific data so that it can support further research. Researchers who want to continue this study can control the attitudes and position of students while learning for

more optimal results.

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