# Ergonomics Demonstration in an Effort to Prevent Low Back Pain Behavior in Apple Chip Making Workers at Bumiaji Village, Batu City

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ABSTRACT

Low Back Pain is pain felt in the lower back area starting from below the ribs or waist localized radicular pain. The purpose of the study was to determine the effect of ergonomic demonstrations on low back pain prevention behavior in apple chip makers in Bumiaji Village, Batu City. Using a Pre-Experiment design with a One-Group Pre-Post Test Design. The study population was 240 and the study sample was 71 respondents with determination using simple random sampling. The data collection technique used a low back pain prevention behavior observation sheet. Using a Paired T Test. The results showed that before being given an ergonomic demonstration, almost all 57 (80.3%) respondents had low back pain prevention behavior in the poor category and after being given an ergonomic demonstration, almost all 58 (81.7%) respondents had low back pain prevention behavior in the good category. The results of the Paired T Test proved that there was an effect of ergonomic demonstrations on low back pain prevention behavior in apple chip makers in Bumiaji Village, Batu City with a p value = (0.000). The conclusion is that there is an effect of ergonomic demonstration given for 20-30 minutes for 1 treatment which is able to increase lower back pain prevention behavior from poor to good.

## I. Introduction

Apple chip makers are jobs that require high-intensity physical movement. Sudden standing, sitting and squatting body positions while working can cause joint problems. One of the joint diseases that is often experienced by apple chip makers due to sudden standing, squatting and sitting is low back pain (Salsabila et al., 2024). Actions to prevent low back pain in workers include providing ergonomic demonstrations. Ergonomic demonstrationis an ergonomics training by means of demonstration which aims to adjust the workplace so that employees remain healthy, safe, and productive (Salwa et al., 2023). The actions taken in ergonomics demonstrations are to provide demonstrations of exercise movements to prevent low back pain.

Research by Anggarani et al., (2022) proved that providing health education on ergonomic positions can improve workers' knowledge, attitudes and behavior in preventing low back pain. Based on this study, it can be understood that providing ergonomics demonstrations plays an important role in improving knowledge and behavior so that workers can do sports movements to prevent low back pain.

Based on the results of an interview on October 10, 2024 with 10 apple chip makers in Bumiaji Village, Batu City, it was found that 9 people explained that they often experienced lower back pain due to sitting and squatting too long while working. Based on the discussion,

the title of this study is ergonomics demonstration in an effort to prevent low back pain behavior in apple chip makers in Bumiaji Village, Batu City.

The objectives of this study are 2, namely general objectives and specific objectives where the general objective is to determine the effect of ergonomics demonstration on low back pain prevention behavior in apple chip makers in Bumiaji Village, Batu City. While the specific objectives are to identify low back pain prevention behavior before being given ergonomics demonstration to apple chip makers in Bumiaji Village, Batu City, to identify low back pain prevention behavior after being given ergonomics demonstration to apple chip makers in Bumiaji Village, Batu City, and to analyze the effect of ergonomics demonstration on low back pain prevention behavior in apple chip makers in Bumiaji Village, Batu City.

## II. Methods

The research design is Pre Experiment with One-Group Pre-Post Test Design is a design that only provides treatment to one group without a control or comparison group (Vinsensius, 2023). The population in this study were all apple chip makers in Bumiaji Village, Batu City, slicing section, totaling 71 people. While the sample in this study was 71 apple slicing section workers in Bumiaji Village, Batu City.

This study uses the total sampling technique, where the sampling is taken from all populations during the study. The variables used in this study use independent variables and related variables. The data collection procedure in this study is direct by using the questionnaire method, using data analysis editing, conding, scoring, and tabulating. While the data analysis is univariate analysis, bivariate analysis, and research ethics.

## III. Results and Discussion

### Results

### 1. Respondent Characteristics

General data of respondents in this study include age, gender and education, the data is presented as follows.

**Table 1 Frequency Distribution Based on Respondents' Age in Bumiaji Village, Batu City in 2025**

| Age | Frequency | Percentage (%) |
|---|---|---|
| 25-35 years | 22 | 31.0 |
| 36-45 years | 35 | 49.3 |
| 46-59 years | 14 | 19.7 |
| **Gender** | | |
| Man | 18 | 25.4 |
| Woman | 53 | 74.6 |
| **Education** | | |
| SD | 18 | 25.4 |
| JUNIOR HIGH SCHOOL | 17 | 23.9 |
| SENIOR HIGH SCHOOL | 36 | 50.7 |
| Total | 71 | 100 |

Based on Table 1 it is known that almost half 35 (49.3%)respondents were aged between 36-45 years, mostly 53 (74.6%)respondents were female and almost half (50.7%) were female.%)respondents with high school education.

### 2. Variable Characteristics

Specific data in the study presented data on low back pain prevention behavior before and after an ergonomics demonstration was given to apple chip makers., data is presentedas follows.

**Table 2 Frequency Distribution of Low Back Pain Prevention Behavior Before and After Ergonomics Demonstration Given to Apple Chips Makers in Bumiaji Village, Batu City in 2025**

| Preventive behavior *low back pain* | ***PreTest*** | | ***Post Test*** | |
|---|---|---|---|---|
| | Frequency | Percentage (%) | Frequency | Percentage (%) |
| Good | 0 | 0.0 | 58 | 81.7 |
| Enough | 14 | 19.7 | 13 | 18.3 |
| Not enough | 57 | 80.3 | 0 | 0.0 |
| Total | 71 | 100 | 71 | 100 |

Based on Table 2, it is known that before being given an ergonomics demonstration, almost all 57 (80.3%)Respondents had low back pain prevention behavior in the low category among apple chip makers in Bumiaji Village, Batu City, and after being given an ergonomics demonstration, almost all 58 (81.7)%) respondentshave good category of low back pain prevention behavior in apple chip makers in Bumiaji Village, Batu City.

**Table 3 Cross TabulationThe Effectiveness of Ergonomics Demonstration on Low Back Pain Prevention Behavior in Apple Chips Makers in Bumiaji Village, Batu City Year 2025**

| Low back pain prevention behavior | | After | | | | Total | |
|---|---|---|---|---|---|---|---|
| | | Good | | Enough | | | |
| | | f | % | f | % | f | % |
| Before | Enough | 13 | 18.3 | 1 | 1.4 | 14 | 19.7 |
| | Not enough | 45 | 63.4 | 12 | 16.9 | 57 | 80.3 |
| | Total | 58 | 81.7 | 13 | 18.3 | 71 | 100.0 |

Based on Table 3, the research results showbefore being given an ergonomics demonstration almost all 57 (80.3)%)respondents experienced low back pain prevention behavior in the low category and after being given an ergonomics demonstration almost all 45 (63.4)%) Respondents have good category of low back pain prevention behavior among apple chip makers in Bumiaji Village, Batu City. These results prove that there is an increase in low back pain prevention behavior.which was previously in the poor category has become good for apple chip makers.

### 3. Statistical Test Results

This study uses a test *Paired T Test* To determine the influence of ergonomic demonstration on low back pain prevention behavior in apple chip makers in Bumiaji Village, Batu City, data decision making is seen from the level of significance (α) of less than 0.05, the data is presented as follows.

**Table 4 Analysis Influence *Ergonomics Demonstration* To Behavior Prevention of Low Back Pain in Apple Chips Workers**

| Variables | N | *p-value* |
|---|---|---|
| The influence of ergonomics demonstration on low back pain prevention behavior | 71 | 0,000 |

Based on Table 4, it is proven that the results of the Paired T Test analysis were obtained.*p-value*= (0.000) < (0.05) means there isthe influence of ergonomics demonstration on low back pain prevention behavior in apple chip makers in Bumiaji Village, Batu City. This result can be understood that there is an increase in low back pain prevention behavior from poor to good after being given an ergonomics demonstration.

## Discussion

### 1. Low Back Pain Prevention Behavior Before Being Given Ergonomics Demonstration in Apple Chips Makers

The results of the study showed that before being given an ergonomics demonstration, almost all 57 (80.3%) respondents had a low back pain prevention behavior in the category of apple chip makers in Bumiaji Village, Batu City. Low back pain prevention behaviors such as not stretching before starting work, not maintaining good posture when sitting, standing, or lifting weights, not stretching after sitting for a long time, lifting heavy weights and doing excessive physical activities that trigger pain.

Research by Salwa et al., (2023) explains that inadequate low back pain prevention behavior can cause someone to experience low back pain, because they do not stretch. Low back pain prevention behavior is an action taken to prevent low back pain in workers. According to Wahyuni (2021), the most common causes of low back pain are muscle tension or improper sitting position, sitting habits, working bent over for a relatively long time and lifting heavy loads.

Research by Salwa et al., (2023) explains that low back pain is a musculoskeletal disorder of the pelvic area caused by poor body activity. Based on the research results, it is known that the causative factor of low back pain is caused by age.almost half 35 (49.3%)respondents were aged between 36-45 years. This age is a productive age, where someone is active in working which causes high cases of work-related injuries. According toThe Greatest Showman (2017)The cause of work-related injuries is due to too much movement, sitting too long and lifting heavy loads.

According to the researcher's opinion, someone who experiences low back pain prevention behavior is in the less category, such as not stretching before starting work, not stretching after sitting for a long time and not maintaining the correct sitting position while working. The impact of low back pain on workers is causing work disruption, unproductive work and work not achieving targets due to back pain.

### 2. Low Back Pain Prevention Behaviors After Giving Ergonomics Demonstration to Apple Chips Workers

The results of the study showed that after being given an ergonomics demonstration, almost all 58 (81.7%) respondents had good low back pain prevention behavior in apple chip makers in Bumiaji Village, Batu City, meaning that providing an ergonomics demonstration was able to increase low back pain prevention behavior from poor to good in apple chip makers. Good low back pain prevention behavior such as stretching Before starting work, maintain good posture when sitting, standing, or lifting weights, stretch after sitting for a long time, avoid lifting heavy weights that can injure muscles, lift very heavy weights together to avoid muscle injuries, and avoid excessive physical activity.

*Ergonomics demonstration*is a form of training that provides guidance to workers on how to work safely (Putri & Prastowo, 2024). Ergonomics demonstrations are given for 20-30 minutes in 1 meeting. Research by Putri & Prastowo (2024) explains that the purpose of ergonomics demonstrations is to improve low back pain prevention behavior from poor to good. The purpose of providing ergonomics demonstrations is to provide information, increase knowledge, attitudes and behavior to prevent low back pain.

Research by Salsabila et al., (2024) explains that health education with the ergonomics demonstration method is important because it can improve knowledge and skills, as well as workers' awareness of health. The benefits of ergonomics demonstration are improving knowledge and skills, increasing public awareness of health, helping people understand and

implement healthy lifestyles, helping people intervene in behavioral factors at work, helping people maintain and improve their health while working.

According to the researcher's opinion, ergonomic demonstrations are able to increase low back pain prevention behavior from poor to good in apple chip makers, meaning that providing ergonomic demonstrations is effective in providing...information,improve knowledge, attitudes and behavior so that apple chip makers can prevent low back pain by stretching before working and after sitting for too long, and knowing the correct position for lifting heavy objects.

**3. Influence *Ergonomics Demonstration* On Low Back Pain Prevention Behavior in Apple Chips Makers**

The results of the study showed that there was an influence of ergonomics demonstration on low back pain prevention behavior in apple chip makers in Bumiaji Village, Batu City, meaning that providing ergonomics demonstration was effective in increasing low back pain prevention behavior in apple chip makers, from poor to good low back pain prevention behavior.

The results of this study can be understood that there is an increase in low back pain prevention behavior from poor to good after being given an ergonomics demonstration. These results support the research conducted by Putri & Prastowo (2024) that there is an influence of ergonomics demonstration on increasing low back pain prevention behavior in workers, where there is improvement of low back pain prevention behavior from poor to good after being given ergonomics demonstration. Kurniawati's research (2017) explains that providing ergonomics demonstration can improve knowledge, attitudes and behavior in preventing low back pain in workers.

Research by Anggarani et al., (2022) explains that health education using the ergonomics demonstration method is one of the learning methods that aims to increase workers' knowledge and motivation to work safely in preventing low back pain. The ergonomics demonstration method in increasing low back pain prevention behavior is to provide information on the correct work position, starting from stretching before work, sitting, standing and lifting heavy objects. The importance of ergonomics demonstration so that workers have good knowledge and behavior to apply at work.

Based on observations during the 4-week study, it was found that the most common action was lifting heavy objects together, while the least common action was not stretching before working. The study was conducted in the management section because this section carries out high activities such as often suddenly bending and standing, and lifting heavy loads while working.

According to the researcher's opinion, *ergonomics demonstration* able to improve workers' knowledge, attitudes and behavior in preventing low back pain. The benefits of providing ergonomics demonstrations are providing information on how to stretch before working, explaining good posture when sitting, standing or lifting weights, informing that when lifting very heavy weights, you must together, And inform that sitting or standing positions are too long. These results are in accordance with the opinion of Maulana (2016) who explained that the objectives of ergonomics demonstration include facilitating the delivery of information to workers, avoiding misperceptions, clarifying information about preventing low back pain clearly, directly demonstrating low back pain prevention materials clearly and facilitating communication with workers.

## IV. Conclusion

Before being given an ergonomics demonstration, almost all 57 (80.3%) respondents had a low back pain prevention behavior in the poor category among apple chip makers in Bumiaji Village, Batu City. After being given an ergonomics demonstration, almost all 58 (81.7%) respondents had a good low back pain prevention behavior among apple chip makers in Bumiaji Village, Batu City. There was an influence of ergonomics demonstration on low back pain prevention behavior among apple chip makers in Bumiaji Village, Batu City, obtained a p value = (0.000) < (0.05), meaning that providing ergonomics demonstration was able to increase low back pain prevention behavior from poor to good in apple chip makers.

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