

DIFFERENCES IN ANGLE OF TRUNK ROTATION AS AN INDICATOR OF SCOLIOSIS BETWEEN THE USE OF TOTE BAG AND BACKPACK

Ni Kadek Niken Ayu Lestari^{1*}, Sri Harmadji², Theodora³

Mahasiswa Fakultas Kedokteran, Universitas Wijaya Kusuma Surabaya¹

Dosen Fakultas Kedokteran, Universitas Wijaya Kusuma Surabaya²

Dosen Fakultas Kedokteran, Universitas Wijaya Kusuma Surabaya³

Universitas Wijaya Kusuma Surabaya

Correspondence author email: kdnikenayulestari@gmail.com

Phone: 082147604520

Abstract

Scoliosis comes from the Greek word “scoliosis” which means crooked. Scoliosis is a complex three-dimensional deformity of the spine, characterized by a lateral deviation of at least 10 degrees with rotation of the vertebrae and usually associated with reduction of the normal kyphotic curvature of the spine (Hypokyphosis). This incident can be associated with the use of bags, one of which is a tote bag or tote bag. A square or rectangular tote bag with two handle straps, used by hand or embraced on one shoulder. Tote bags are usually used as a substitute for backpacks by female students. Using a bag that only relies on one side of the body can have a negative impact on the spine, such as deformity or curvature of the spine. If left unchecked, the curvature of the spine will be more progressive and lead to scoliosis. Therefore, because many female students use tote bags during lectures, researchers are interested in conducting research to examine the differences in angle of trunk rotation between the use of tote bags and backpacks by female students of the Faculty of Medicine, University of Wijaya Kusuma, Surabaya, class of 2020. This research is an analytical approach using cross sectional. The population in this study were female students at the Faculty of Medicine, Wijaya Kusuma University, Surabaya, class of 2020 who were still active and met the inclusion and exclusion criteria, with a sample size of 66 female students. The statistical test used is the Kruskal Wallis test. Based on the results of the research and discussion carried out, it can be concluded that there is no difference in the angle of trunk rotation between the use of tote bags and backpacks by female students of the Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020, as evidenced by a p-value of $0.463 > 0.05$.

Kata Kunci: Angle of trunk rotation, scoliosis, tote bag, backpack

PERBEDAAN ANGLE OF TRUNK ROTATION SEBAGAI INDIKATOR SKOLIOSIS ANTARA PENGGUNAAN TOTE BAG DAN RANSEL

Abstrak

Skoliosis berasal dari kata Yunani “scoliosis” yang berarti bengkok. Skoliosis adalah kelainan bentuk tiga dimensi yang kompleks dari tulang belakang, ditandai dengan deviasi lateral minimal 10 derajat dengan

rotasi vertebra dan biasanya terkait dengan pengurangan kelengkungan kyphotic normal tulang belakang (Hypokyphosis). Kejadian ini dapat dikaitkan oleh penggunaan tas salah satunya adalah Tote bag atau tas jinjing. Tote bag berbentuk kotak atau persegi panjang dengan dua buah tali pegangan, digunakan dengan cara dijinjing atau dirangkul di salah satu bahu. Tote bag biasanya digunakan sebagai pengganti ransel oleh mahasiswa. Penggunaan tas yang hanya mengandalkan satu sisi tubuh dapat berdampak buruk pada tulang belakang seperti terjadinya deformitas atau tulang belakang melengkung. Jika dibiarkan, kelengkungan tulang belakang akan semakin progresif dan berujung ke skoliosis. Maka dari itu, karena banyaknya mahasiswa yang menggunakan tote bag saat perkuliahan, peneliti tertarik untuk melakukan penelitian untuk meneliti perbedaan angle of trunk rotation antara penggunaan tote bag dan ransel oleh mahasiswa Fakultas Kedokteran Universitas Wijaya Kusuma Surabaya Angkatan 2020. Penelitian ini bersifat analitik dengan menggunakan pendekatan cross sectional. Populasi pada penelitian ini adalah Mahasiswa Fakultas Kedokteran Universitas Wijaya Kusuma Surabaya Angkatan 2020 yang masih aktif dan memenuhi kriteria inklusi serta eksklusi dengan besar sampel yang diambil sebanyak 66 mahasiswa. Uji statistik yang digunakan adalah uji Kruskal Wallis. Berdasarkan hasil penelitian dan pembahasan yang dilakukan maka bisa ditarik kesimpulan bahwa tidak ada perbedaan angle of trunk rotation antara penggunaan tote bag dan ransel oleh mahasiswa Fakultas Kedokteran Universitas Wijaya Kusuma Surabaya Angkatan 2020, terbukti dengan p-value sebesar $0,463 > 0,05$.

Keywords: Sudut rotasi batang tubuh, skoliosis, tas bahu, ransel

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INTRODUCTION

A tote bag or in Indonesian is defined as a tote bag, which is a box or rectangular bag with two handle straps and is worn by hand or embraced on one shoulder. This tote bag is usually used as a substitute for a backpack by women, including female students. The reason, the use of tote bags is considered more simple and fashionable. Usually female students use tote bags to carry their college equipment, such as books, gadgets, and even laptops. However, using a bag that only relies on one side of the body can have a negative impact on the body, not only in one part of the body, but can occur in various parts of the body. Plus, too much overload can cause spinal disorders which can cause spinal deformities such as scoliosis, kyphosis, and lordosis (Yolanda Anggita, 2021).

Scoliosis comes from the Greek word “scoliosis” which means crooked. Scoliosis is a complex three-dimensional deformity of the spine characterized by a lateral deviation of at least 10 degrees with vertebral rotation and is usually associated with reduction of the normal

kyphotic curvature of the spine (Hypokyphosis) (Choudhry et al., 2016). The two main groups of scoliosis consist of idiopathic scoliosis and non-idiopathic scoliosis. The diagnosis of idiopathic scoliosis can be made if non-idiopathic scoliosis has been ruled out (Konieczny et al., 2013).

Factors that influence the incidence of scoliosis include genetic factors, age, and gender. As many as 97% of AIS (Adolescent Idiopathic Scoliosis) patients are related to their family members who also suffer from AIS. Based on age, a higher prevalence of scoliosis occurs in patients over 15 years of age (after puberty). Meanwhile, based on gender, the overall prevalence ratio of women to men is 2:1 with an increase with age (Konieczny et al., 2013).

To diagnose scoliosis, an anamnesis is performed including age, birth history, developmental milestones, family history, assessment of physiological maturity (eg menarche) and presence or absence of pain. The physical examination should include an assessment of baseline curve pattern, shoulder level, waist asymmetry, and pelvic tilt. Rotational

deformity of the ribs (rib hump) should be evaluated by performing the Adam forward bend test. A positive test will reveal a rib hump on the convex side of the curve (Choudhry et al., 2016).

Early detection of scoliosis plays an important role in preventing the deformity and spinal damage from worsening. Early detection of scoliosis using a scoliometer is carried out to prevent scoliosis by finding signs of spinal curvature in the group without symptoms and complaints. The scoliometer is used to measure lateral body asymmetry in degrees of axial rotation or ATR (angle of trunk rotation), which is done by bending (Nabila E, 2020).

Using a bag that only relies on one side of the body, such as a tote bag, can have a negative impact on spinal conditions, such as spinal deformity, namely a curved spine. If left unchecked, the curvature of the spine will be more progressive and lead to scoliosis. Therefore, because many female students use tote bags during lectures, researchers are interested in conducting research to examine the differences in angle of trunk rotation between the use of tote bags and backpacks by female students of the Faculty of Medicine, University of Wijaya Kusuma, Surabaya, class of 2020.

MATERIAL AND METHODS

Research Design

This research is analytic in nature with the data collection technique used is to measure with a scoliometer to determine ATR. In practice, this study used a cross-sectional approach, in which the researcher only observed and measured variables at one time.

Population and Research Sample

The population in this study were female students at the Faculty of Medicine, Wijaya Kusuma University, Surabaya, class of 2020 who were still active and met the inclusion and exclusion criteria. The sample size was 66 female students. This sample was taken using simple random sampling.

Data analysis technique

Data analysis in this study used the SPSS statistic program with the following stages:

1. Editing

Editing is done by re-examining all the collected data and ensuring that the data is complete with the aim that the data obtained is correct information.

2. Coding

Coding aims to code the data obtained in order to make it easier to process and analyze data by providing codes in the form of numbers.

3. Tabulating

Data processing will be carried out by means of tabulation according to the variables studied. Tabulating is done by entering data into tables and adjusting the numbers so that the number of cases in various categories can be counted.

RESEARCH RESULT

Characteristics of respondents

Table 1. Distribution of Respondents Based on Bag Use by Student of the Faculty of Medicine, Wijaya Kusuma University, Surabaya, Class of 2020

Use of Bag	Frequency	Percentage %
Backpack	15	22,7
Tote bag	41	62,1
Mix	10	15,2
Total	66	100

Source: 2023 research results

In Table 1 it is known that the majority of female students at the Faculty of Medicine, Wijaya Kusuma University Surabaya Class of 2020 use tote bags, namely 41 people or 62.1%, as many as 15 people or 22.7% use backpacks and 10 people or 15.2% others use mixed bag.

Table 2. Distribution of Respondents Based on Bag Load and Body Weight of Student of the Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020

Bag load	Frequency	Persentase %
Ideal (< 10%)	60	90,9
Not ideal (> 10%)	6	9,1
Total	66	100

Source: 2023 research results

In Table 2 it is known that the majority of female students at the Faculty of Medicine, Wijaya Kusuma University, Surabaya Class of 2020 use bags with <10% weight (ideal) weight, namely 60 people or 90.9% and as many as 6 people or 9.1% who use bags with load > 10% body weight (not ideal).

Table 3. Distribution of Respondents Based on Time of Use of Student Bags, Faculty of Medicine, University of Wijaya Kusuma, Surabaya Batch 2020

Waktu pemakaian tas	Frequency	Percentage %
Normal (< 10 minutes)	17	25,8
Risk of back pain (> 10 minutes)	49	74,2
Total	66	100

Source: 2023 research results

In Table 3 it is known that most of the 2020 class of Wijaya Kusuma University Surabaya Medical Faculty students use bags for more than 10 minutes (at risk of back pain), namely 49 people or 74.2% and as many as 17 people or 25.8% others use bags less than 10 minutes (normal).

Table 4 Distribution of Respondents Based on Angle of Trunk Rotation (ATR) for Student of the Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020

Angle of Trunk Rotation	Frequency	Percentage %
Within normal limits	44	66,7

Intermediate	20	30,3
Relevan dengan tingkat probabilitas tinggi skoliosis	2	3
Total	66	100

Source: 2023 research results

In Table 4 it is known that the majority of female students at the Faculty of Medicine, University of Wijaya Kusuma, Surabaya Class of 2020 have an angle of trunk rotation within normal limits, namely 44 people or 66.7%, as many as 20 people or 30.3% are in the intermediate category and only 2 people or 3% which is relevant to a high degree of probability of scoliosis.

Crosstab between bag usage and angle of trunk rotation

Table 5. Crosstabs of Bag Use with Angle of Trunk Rotation in Student Faculty of Medicine, University of Wijaya Kusuma, Surabaya Batch 2020

Use of Bags	ATR		
	Within normal limits	Intermediate	Relevant to the high probability of scoliosis
Ransel	11 73,3%	3 20%	1 6,7%
Tote bag	25 61%	15 36,6%	1 2,4%
Campur	8 80%	2 20%	0 0,0%
Total	44 66,7%	20 30,3%	2 3%

Source: 2023 research results

Based on Table 5, it shows that of the 100% of female students at the Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020 who use backpacks, 73.3% of the angle of trunk rotation is within normal limits,

20% intermediate and 6.7% relevant to a high probability of scoliosis. Of the 100% who use a tote bag, 61% of their angle of trunk rotation is within normal limits, 36.6% intermediate and 2.4% relevant to a high degree of probability of scoliosis. Of the 100% using a mixed bag, 80% of the angle of trunk rotation was within normal limits, 20% intermediate and none were relevant to a high degree of probability of scoliosis.

Crosstab between Bag Load and Angle of trunk rotation

Table 6 Crosstab of Bag Load with Angle of trunk rotation for Student of the Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020

Bag Load from Body Weight	ATR		
	Within normal limits	Intermediate	Relevant to the high probability of scoliosis
Bag load <10% of body weight	39 65,0%	19 31,7%	2 3,3%
Bag load >10% of body weight	5 83,3%	1 16,7%	0 0%
Total	44 66,7%	20 30,3%	2 3%

Source: 2023 research results

Based on Table 6, it shows that of the 100% female students of the Faculty of Medicine, University of Wijaya Kusuma, Surabaya, class of 2020 whose bag load was <10% of body weight, 65.0% had an angle of

trunk rotation within normal limits, 31.7% intermediate and 3.3% is relevant to a high degree of probability of scoliosis. Of the 100% whose bag load was >10% of body weight, 83.3% had an angle of trunk rotation within normal limits, 16.7% intermediate and 0% relevant to a high probability of scoliosis.

Crosstab between Bag Load and Angle of trunk rotation

Table 7. Crosstab of Bag Loads with Angle of trunk rotation in Student of the Faculty of Medicine, University of Wijaya Kusuma, Surabaya Class 2020

Bag Usage Time	ATR		
	Within normal limits	Intermediate	Relevant to the high probability of scoliosis
<10 minutes	12 70,6%	5 29,4%	0 0%
>10 minutes	32 65,3%	15 30,6%	2 4,1%
Total	44 66,7%	20 30,3%	2 3%

Source: 2023 research results

Based on Table 7, it shows that of the 100% female students of the Faculty of Medicine, University of Wijaya Kusuma, Surabaya Class of 2020 who use bags <10 minutes, 70.6% of the angle of trunk rotation is within normal limits, 29.4% intermediate and 0% relevant to high probability rate of scoliosis. Of the 100% who used the bag for <10 minutes, 65.3% of the angle of trunk rotation was within normal limits, 30.6% intermediate and 4.1%

relevant to the high probability of scoliosis.

Data analysis

Once the characteristics of each variable (univariate) are known, it can be continued with bivariate analysis to find out the differences. In the following, the test results will be presented using the Kruskal Wallis test.

H₀ : There is no difference in the angle of trunk rotation between the use of tote bags and backpacks by female students of the Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020

H₁ : There is a difference in the angle of trunk rotation between the use of tote bags and backpacks by female students of the Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020

Table 8. Differences in the Angle of Trunk Rotation between the Use of Tote Bags and Backpacks by Student of the Faculty of Medicine, University of Wijaya Kusuma, Surabaya Class of 2020

Difference	p-value	Explanation
Penggunaan tas <--> <i>Angle Of Trunk Rotation</i>	0,463	There is no difference

Source: 2023 research results

Table 6 shows that the results of the Kruskal Wallis test obtained a p-value of 0.463 > 0.05, which means that H₀ is accepted so that there is no difference in the angle of trunk rotation between the use of tote bags and backpacks by female students of the Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020.

The following will present the results of testing using the Chi Square test.

H₀ : There is no difference in the angle of trunk rotation between bag loads <10% of body weight and bag loads >10% of body weight by female students of the

Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020

H₁ : There is a difference in the angle of trunk rotation between bag loads <10% of body weight and bag loads >10% of body weight by female students of the Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020

Table 9. Differences in Angle of Trunk Rotation between Bag Loads <10% of Body Weight and >10% of Body Weight by Student of the Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020

Difference	p-value	Explanation
Bag load of weight <--> <i>Angle of trunk rotation</i>	0,644	There is no difference

Source: 2023 research results

Table 9 shows that the results of the Chi Square test obtained a p-value of 0.644 > 0.05, which means that H₀ is accepted so that there is no difference in angle of trunk rotation between bag loads <10% of body weight and bag loads >10% of body weight agency by students of the Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020.

The following will present the results of testing using the Chi Square test.

H₀ : There is no difference in the angle of trunk rotation between the bag usage time <10 minutes and the bag usage time >10 minutes by female students of the Faculty of Medicine, Wijaya Kusuma University Surabaya Class of 2020

H₁ : There is a difference in the angle of trunk rotation between the bag usage time <10 minutes and the bag usage time >10 minutes by female students of the Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020

Table 10 Differences in Angle of Trunk Rotation between Bag Usage Time <10 minutes and Bag

usage time >10 minutes by Student Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020

Perbedaan	p-value	Explanation
Bag usage time <--> Angle of trunk rotation	0,686	Tidak ada perbedaan

Source: 2023 research results

Table 10 shows that the results of the Chi Square test obtained a p-value of 0.686 > 0.05, which means that H0 is accepted so that there is no difference in the angle of trunk rotation between bag usage time <10 minutes and bag usage time >10 minutes by Faculty students Medicine, Wijaya Kusuma University, Surabaya Class of 2020.

DISCUSSION

This study aims to determine the difference in angle of trunk rotation between the use of tote bags and backpacks by female students of the Faculty of Medicine, University of Wijaya Kusuma, Surabaya, class of 2020.

The results showed that most of the 2020 class of Wijaya Kusuma University Surabaya Medical Faculty students used tote bags, namely 41 people or 62.1%, 15 people or 22.7% used backpacks and 10 people or 15.2% others used bags. mixture. These results illustrate that female students of the Faculty of Medicine, Wijaya Kusuma University, Surabaya prefer to use tote bags instead of backpacks because they feel more simple and fashionable.

The results of Septiani's research (2017) found that the use of a shoulder bag (tote bag) for a long and heavy period of time can have negative effects on the human body, one of which is musculoskeletal problems, muscle spasms, and body tilt. The results showed that most of the 2020 class of Wijaya Kusuma University Surabaya Medical Faculty students used a bag for more than 10 minutes (at risk of back pain), namely 49 people or 74.2% and as many as 17 people or 25.8% others used a bag

less than 10 minutes (normal). These results provide an illustration if female students of the Faculty of Medicine, University of Wijaya Kusuma, Surabaya Class of 2020 do not reduce their habit of carrying bags for more than 10 minutes every day in the future they are likely to experience scoliosis. From the results of the analysis using the Chi square test, the results obtained were that there was no difference in the angle of trunk rotation between the bag usage time <10 minutes and the bag usage time >10 minutes by female students of the Faculty of Medicine, University of Wijaya Kusuma, Surabaya, class of 2020. This could be due to female students using bag > 10 minutes has an ideal bag load so it doesn't affect the spine too much.

These results are supported by research conducted by Yolanda Anggita (2021) who also found that the use of a bag that only relies on one side of the body can have a negative impact on the body, this is exacerbated by the overload of the bag causing disturbances in the spine which causes deformity spine such as scoliosis, kyphosis, and lordosis. From research conducted by Ali El-Nagar (2017), students who carry school bags for 20 -30 minutes or more per day are about three times more likely to suffer from back pain than students who carry school bags for <10 minutes.

The results showed that most of the female students at the Faculty of Medicine, University of Wijaya Kusuma, Surabaya Class of 2020 had an angle of trunk rotation within normal limits, namely 44 people or 66.7%, 20 people or 30.3% were in the intermediate category and only 2 people or 3 % which is relevant to a high degree of probability of scoliosis. These results illustrate that most respondents still have an angle of trunk rotation within normal limits, only 3%, which is at high risk of experiencing scoliosis. This indicates that female students of the Faculty of Medicine, Wijaya Kusuma University, Surabaya use the bag in the right way, and carry the load as needed, which is not too heavy to burden the body.

According to research by Qureshi et al. (2012) if the bag is used correctly it will not cause harmful effects on the body. Back and shoulder pain due to using a bag is actually a very common thing. But unfortunately, there are still many people who do not realize that the pain they feel is caused by using the wrong bag. The correct way to use a sling bag (tote bag) or backpack is not to put too many things in it. The position of the items in the bag will also affect the condition of the back and shoulders. Ideally, it is recommended to place the heaviest items in the innermost part of the bag closest to the back.

Some people deliberately wear backpacks with the straps extended to the maximum, so that the position of the bag is below the waist. This is actually not recommended from a health point of view, because it will increase the pressure on the shoulders and trigger pain. Likewise, if you carry a backpack with tight and narrow straps that pull your shoulders, it can interfere with blood circulation and nerves. Carrying a bag that is too heavy over time will make your back and shoulders hurt. The results of the study found that the majority of female students at the Faculty of Medicine, Wijaya Kusuma University, Surabaya Class of 2020 used bags with a weight < 10% (ideal) weight, namely 60 people or 90.9% and as many as 6 people or 9.1% who used bags with weights > 10% of body weight (not ideal), meaning that most students are carrying bags with an ideal load (<10% of body weight) so that it does not cause excessive burden on the back and shoulders. From the results of the analysis using the Chi square test, the results obtained were that there was no difference in the angle of trunk rotation between bag loads <10% of body weight and bag loads >10% of body weight by female students of the Faculty of Medicine, University of Wijaya Kusuma Surabaya Class of 2020. This could be due because female students with a bag load > 10% of body weight use the bag in a short time so that the spine is not burdened too often by the bag.

The results of this study indicate that there is no difference in the angle of trunk rotation

between the use of tote bags and backpacks by female students of the Faculty of Medicine, University of Wijaya Kusuma, Surabaya, Class of 2020, as evidenced by a p-value of $0.463 > 0.05$. Of the 100% of Wijaya Kusuma University Surabaya School of Medicine students class of 2020 who used backpacks, 73.3% of the angle of trunk rotation was within normal limits, 20% intermediate and 6.7% relevant to a high probability of scoliosis. Of the 100% who use a tote bag, 61% of their angle of trunk rotation is within normal limits, 36.6% intermediate and 2.4% relevant to a high degree of probability of scoliosis. Of the 100% who use mixed bags, 80% of the angle of trunk rotation is within normal limits, 20% is intermediate and none is relevant to a high degree of probability of scoliosis.

These results provide evidence that the use of tote bags and backpacks both carries the same risk of developing scoliosis in the future if the use of the bag is not correct. This insignificant result was more due to the small number of cases of scoliosis that occurred in female students at the Faculty of Medicine, University of Wijaya Kusuma, Surabaya, class of 2020 when detection was carried out by looking at the angle of trunk rotation. In addition, this insignificant result could be due to the fact that the respondents are medical students who already understand health so that many respondents already understand how to use the correct bag.

CONCLUSION

Based on the results of the research and discussion conducted, it can be concluded that there is no difference in angle of trunk rotation as an indicator of scoliosis between the use of tote bags and backpacks by female students of the Faculty of Medicine, Wijaya Kusuma University, Surabaya class of 2020, as evidenced by a p-value of $0.463 > 0.05$.

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