

# Knowledge Level Analysis of Pre-Service Biology Teacher on Fact and Myth Down Syndrome

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**ABSTRACT.** Down syndrome is a genetic disorder caused by "nondisjunction of chromosomes" during cell division, which usually results in two copies of chromosome 21, but in down syndrome sufferers produce three copies of chromosomes to have 47 chromosomes. A lot of facts and myths about down syndrome as well as a great many pre-service biology teachers are misconceptions about down syndrome. The aim of this study is to measure the level of knowledge of pre-service biology teachers and to shed light on fact and myth down syndrome. Researchers used a descriptive method with a sample study of 30 pre-service biology teachers who were contrasting genetics courses and rigorously chosen with purposive sampling. Data is collected by the study instrument of a questionnaire with 20 questions and sent online using Google form. The result shows that the understanding of pre-service biology's teacher on facts and myth down syndrome with a low category of 3 %, a middle category of 66.7 %, and a high category of 30 %. As for the explanation of fact and myth down syndrome, it is synthesized with several scientific research sources.

**Keywords:** *level of knowledge, pre-service biology teacher, down syndrome, facts, myth*

**ABSTRAK.** Down Syndrome merupakan suatu kelainan genetik yang disebabkan oleh “nondisjunction kromosom” selama pembelahan sel, yang biasanya menghasilkan dua salinan kromosom 21, namun pada penderita Down Syndrome menghasilkan tiga salinan kromosom sehingga memiliki 47 kromosom. Banyak fakta dan mitos mengenai Down Syndrome serta masih banyak calon guru biologi yang mengalami kesalahan pemahaman mengenai Down Syndrome. Tujuan dari penelitian ini yaitu mengukur tingkat pengetahuan calon guru biologi dan memberikan penjelasan mengenai fakta dan mitos Down Syndrome. Peneliti menggunakan metode deskriptif dengan sample penelitian 30 Calon guru biologi yang sedang mengontrak mata kuliah genetika dan dipilih secara purposive. Data dijangar dengan menggunakan instrument penelitian berupa kuesioner yang berisi 20 pertanyaan dan disebar secara online menggunakan google form. Hasil penelitian menunjukkan bahwa pemahaman calon guru biologi mengenai fakta dan mitos Down Syndrome dengan kategori rendah sebesar 3%, kategori sedang sebesar 66,7%, kategori tinggi sebesar 30%. Adapun penjelasan fakta dan mitos sindrom disesuaikan dengan beberapa sumber penelitian yang bersifat ilmiah.

**Kata Kunci:** tingkat pengetahuan, calon guru biologi, down syndrome, fakta, mitos

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## INTRODUCTION

Down syndrome is one of the disorders that can cause intellectual disability. One with down syndrome disorders include learning and memory, congenital heart diseases (CHD), alzheimer's diseases (AD), leukemia, and hirschprung diseases (HD) (Asim, Kumar, Muthuswamy, Jain, & Agarwal, 2015). Down syndrome is a genetic disorder caused by nondisjunction by producing three copies of chromosomes and thus having 47 chromosomes called trisomy (Suryo, 1884., Levkova et al., 2018) Syndr, Abnorm, Priya, & Ramachandran, 2018., ) The other causes can be Robertsonian translocation and isochromosomal or ring chromosome. Isochromosome is a term used to describe a condition in which two long arms of chromosome separate together rather than the long and short arm separating together during egg sperm development. Trisomy 21 (karyotype 47, XX, + 21 for females and 47, XY, + 21 for males) is caused by a failure of the chromosome 21 to separate during egg or sperm development (Asim et al., 2015). Such excess chromosome contributes to a certain excess of protein that interferes with normal growth of the body and causes preprogrammed changes in brain development (Irwanto, Wicaksono, Ariefa & Samosir, 2019., Priya C, 2019). Also, these disorders can cause late physical development, learning disability and other congenital infections.

Down syndrome has a number of facts and myths in which some in academic circles still have misunderstandings and misconceptions about the differences. A recent study of random interviews with five pre-service biology teachers IAIN Kudus who have signed genetic lectures reveals that 3 of the candidates consider the myth of down syndrome to be a fact, that down syndrome is a disorder passed down to offspring, is considered to be a fact. As for the matter it is a myth, because down syndrome is not inherited from posterity.

Facts are a thing or event that really happens (Suyono, 2004). They are something that everyone can see, feel, and feel (Abdullah, 1999). Facts are things (circumstances, events) that are reality, something that actually exists or occurs (KBBI, 2008). Based on some of these views, it may be concluded that fact is a thing or event that actually occurred. Whereas the myth is a collection of traditional stories usually passed down through generations in a nation or with the national family (Kurzweil, Nurhadi, 2010). Facts and myths are

different things. Knowledge of facts and myths among would-be biology teachers should be based on the scientific nature of revealing truth about fact and myth, which, in this case, has to do with down syndrome. Further research is thus needed to measure the level of knowledge of pre-service biology teachers and to shed light on facts and myths down syndrome with its source in scientific references and thus set matters straight in society. It is hoped that this research will provide a basis for revealing the conception of pre-service biology teachers on down syndrome through further research.

## METHOD

The research method used was the descriptive method, which included primary and secondary data collection. In the primary data retrieval, researchers retrieved the data using the online questionnaires using google form on the 30 participants of other pre-service biology teachers of IAIN Kudus who were contrasting genetics courses. The selection of the sample uses the purposive sampling method. As for secondary data collecting done using data previously existing data that comes from various references. The questionnaire's instrument contains 20 statements on down syndrome and then the respondents determine whether the statement falls into myth or fact. Researchers, in turn score on the science of pre-service biology teachers. Suspension involves a file inset of responders' knowledge facts and myths about down syndrome from a questionnaire into a computer program. Then each of the responders' answers was scored. The "5" score is given for the right answer, whereas for the wrong answer is given the "0" score. Then the whole score of answers obtained is quantified, from the sum of the score comes the highest and lowest. Then to determine high, middle, and low categorys are calculated in ways the highest grades are reduced with the lowest scores and divided by 3 according to the number of classes to be made. As for the results of the knowledge level decipherment as follows:

$$\frac{(highest\ score - lower\ score)}{3} = \frac{(100 - 20)}{3} = 26,6$$

**Table 1.** Category level of knowledge

Category	Percentage Range (%)
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Low	20 – 46
Middle	47 - 73
High	74 - 100

The data gathered in the study is further analyzed using quantitative analysis. Quantitative analysis is used to provide an objective conclusion as to what researchers are doing. Additionally, descriptive analysis is also used to explain the phenomena and problems discussed in the study.

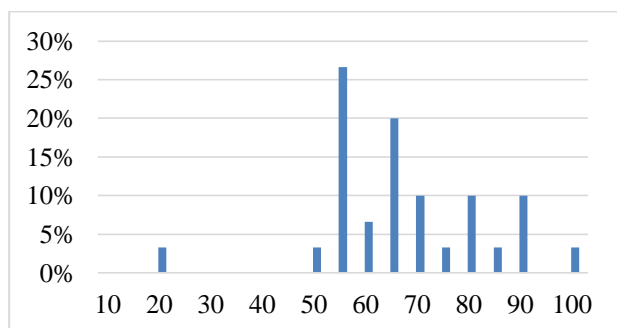
## RESULT AND DISCUSSION

The results of a knowledge-level study of pre-service biology teachers on facts and myths down syndrome are presented at Table 2.

**Table 2.** Respondents' knowledge category on fact and myth down syndrome

No.	Level of Knowledge	Percentage
1	Low category	3,3 %
2	Middle category	66,7 %
3	High category	30 %
	Sum	100%

The above data indicates that pre-service biology teachers' knowledge of fact and myth down syndrome is quite good. The rating was based on a low category of 3 %, a moderate category of 66.7 percent and a high category of 30 percent. This rating comes from the distribution of respondents' value in answering questions regarding statements of myth or fact. As for the score of the respondents can be seen in figure 1



**Figure 1.** Distribution of score respondents

Based on figure 1, it can be known to be the distribution of the biology teacher value. The highest score of pre-service biology teacher has is a 100, with a 3 percent proportion of pre-service biology teachers. A score of 100 is a perfect mark indicating that a pre-service biology teachers answered all questions correctly. The average biology teacher scores at 20 with 3 percent of pre-service biology teachers. The high percentage of pre-service biology teachers, in turn, is the 55-percent propelled by 27 percent. The distribution of these varied grades is possible because of the spontaneous refilling of questionnaires, the concentration of respondents, the memory of the material down syndrome in genetic subjects and the seriousness of the responders in answering problems.

Facts and myths about down syndrome need to be cleared up, lest misunderstandings about down syndrome occur. The presence of facts and myths that have not been clearly profitable for down syndrome sufferers because most children with down syndrome are often excluded from play. The late development he had made his peers' reluctant 'to play with him. They also often experience discrimination behavior because of differences in their abilities. Exemptions performed by the social environment toward people with syndrome may be said to be a form of discrimination (renawati, darwis & wibowo, 2017). Thus, a description of fact and myth down syndrome is expected to educate people to cope more wisely with their outlook. As for the explanation of facts and myths down syndrome collected from secondary data sourced by some scientific references is as follows:

1. Down syndrome is a rare case of childbirth.

Explanation: down syndrome is not a rare case, who states that some 3,000 to 5,000 children are born with down syndrome each year. The who also estimates that there are 8 million with down syndrome worldwide and more than 300,000 in Indonesia (Kemenkes, 2019), and so the claim falls into myth.

2. Down syndrome is a child's chromosomal deficiency.

Explanation: down syndrome is a compilation of symptoms caused by chromosomal abnormality, usually chromosome 21, which cannot break away during meiosis to form an individual with 47 chromosomes (Gunarhadi, 2005). Normal

children have 46 chromosomes so that down syndrome is not a chromosomal deficiency but an excess of chromosomes that the statement is myth.

3. Down syndrome trisomi-21 is a hereditary disorder.

Explanation: some sources say that down syndrome is a sporadic genetic disorder that is unclear to the cause. Down syndrome is not due entirely to heredity, but there are also maternal age, environmental, psychological states (such as stress) and nourishment that mothers obtain, so the above statement falls into myth.

4. Down syndrome is an infectious disease.

Explanation: down syndrome is not a disease, down syndrome is a non-communicable genetic disorder (Belmokhtar & kerfouf, 2016), so the claim is myth.

5. Infant death from down syndrome is high or well above 50 percent.

Explanation: advances in technology in health can help problems with down syndrome and lead to a small infantile of infant death due to down syndrome, so the above statement falls into myth.

6. Down syndrome only happens to men.

Explanation: down syndrome occurs in both boys and girls even though the prostate is different. According to Harahap and Salimar, children with down syndrome aged 24-59 have more sex than boys with 0.08 percent of boys and 0.06 percent of them (Harahap & Salimar, 2015), so the above would be a myth.

7. There has been no known cure for down syndrome.

Explanation: at present, there is no known cure for down syndrome. As for the prevention and reduction of infections raised by monitoring and therapy for down syndrome sufferers (Niece, 2019), so the above statement falls into fact.

8. Life expectancy for people with down syndrome is only 30 years old.

Explanation: the child down syndrome is indeed incurable but with the maximum support and attention of the child down syndrome can grow up happy. Many of them can reach the age of 55 and include the above statement in myth.

9. Down syndrome and autism are similar disorders.

Explanation: Autism is a condition in which children experience tardiness in neurological development and not some congenital defect. While

down syndrome is a hereditary genetic disorder with extra chromosomes (Tiaras, Mundijo & Purwoko, 2018:30). So down syndrome and autism are not the same disorders that include the above statement into myth.

10. Down syndrome can be known by facial features.

Explanation: down syndrome can be identified by a description of flatness (mongolism) face, a slightly cross-eyed eye, a small mouth, a small head, a short head, a short neck, and short limbs (Martin & Fay, 2009). So the above statement falls into fact.

11. Down syndrome sufferers have verbal and reading problems.

Explanation: down syndrome sufferers have disorders in their brain and mental development, as well as limitations in their verbal and reading ability (Yeager C & Sandra, 2018). So the above statement falls into fact.

12. Down syndrometics suffer from hearing loss.

Explanation: children down syndrome differ from systemic factors compared with other normal children, one of them is down syndrome-a child with a hearing problem (Wulandari, Christiono & Ringga, 2017). So the above statement falls into fact.

13. Children with down syndrome usually have short hands and wide intersections.

Explanation: the traits of down syndrome sufferers are physical and include short hands and wide finger distances (Tolentino Castro, Riddell, & Wagner, 2017). So the above statement falls into fact.

14. Kids with down syndrome usually have very small bodies.

Explanation: the physical characteristics of down syndrometics are all about having a small body. So the above statement falls into fact.

15. The kid with down syndrome has a hard time controlling his emotions.

Explanation: some down syndrome children experience excessive anxiety that requires therapy help to cope with their fears (Irwanto, Wicaksono, Ariefa & Samosir, 2019). The above statement is included in the facts.

16. Kids with down syndrome don't achieve anything.

Explanation: the development of down syndrome differs from that of any normal child, but down syndrome may also be achievable.

Achievements of down syndrome include music, choir and martial arts. This coincides with the Indonesia syndrome of down syndrome that inspires confidence by recognizing their potential (Kemenkes, 2019). So the above statement falls into myth.

17. Children with down syndrome usually have a late puberty

Explanation: patients with down syndrome have a high incidence of sexual development disorders and puberty delays in both sexes. In women, reported disorders include a deficiency of gonads marked by a slow flow of the first menstrual ('strobe) or the processing of adrenal glands (adrenarche). In men include ambient genitalia, cryptotormus (nonmoving testicles), micropenises (small penis size), small living balls and low living sperm and the growth of small hairs and beards (Irwanto, Wicaksono, Ariefa & Samosir, 2019). So the above statement falls into fact.

18. Mothers over the age of 40 have the odds of bearing down syndrome children.

Explanation: mothers over 40 years of age increase the risk of bearing children with down syndrome 12 times greater than at a mother's age of less than 35. This relationship can be explained in his patogenesis's description. In the aging mother, the ovum released at the time of ovulation is a result of an ovulation that has tended to be in the long suspended meiosis cycle (Rahmatullah, Rahmanisa & Putri, 2017). So the above statement falls into fact.

19. Mothers with less folic acid have the potential to deliver a child down syndrome.

Explanation: down syndrome may result from an underoptimal body metabolism that breaks folic acid. The downward metabolism of folic acid affects chromosomal formation (Kemenkes, 2019). So the above statement falls into fact.

20. Smoking mothers have the potential for down syndrome children.

Explanation: It is a toxic substance that can affect the development of the unborn. Pregnant mothers who smoke can hinder chromosomal formation and thus have a shorter chromosomal chain (Kemenkes, 2019). So mothers who smoke can increase their potential for childbirth with down syndrome and the foregoing statement as fact.

## CONCLUSION

The explanation of fact and the myth of down syndrome suggests that the majority of pre-service biology teachers know that down syndrome is due to a chromosome mutation no. 21 that affects physical, intellectual, and emotional development. However, down syndrome is not contagious. Pre-service biology teachers' knowledge of fact and myth down syndrome is quite good. Pre-service biology teachers have low proficiency of knowledge by 3.3%, middle rating by 66.7% and high rating by 30%.

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