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Original Research Article

A Study of Effect of Time Spent on Exercise upon Illness Frequency

Rupali Kanade, Deepa Ramane

Sinhgad College of Science, Ambegaon (BK), Pune, India

Corresponding Author: Deepa Ramane

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ABSTRACT

Being physically fit plays an important role in human's life. Physical fitness can be achieved by exercise and healthy diet. This paper provides analysis of time spent on exercise and yearly illness frequency of people in local urban area (India) by using logistic regression.

Keywords: Logistic regression, hypothesis, exercise, physical fitness, illness frequency etc.

INTRODUCTION

More recently, studies have found that people who daily spend more time on watching television, sitting, or riding in cars have a greater chance of dying early than people who are more active. [1] They lack physical exercise of body. The precise amount of exercise needed to achieve or maintain a healthy weight varies based on a person's diet and genes. The American College of Sports Medicine and the American Heart Association support the idea that "more activity increases the probability of success". [2] It has observed that when physical activity is used as a break from academic learning time, post engagement effects include better attention. [3] It is said that to maintain a good healthy life for adults (age group 18-65) should maintain regular exercise schedule. For example-for good health, 10,000 steps a day is recommended – this is about 8km depending on stride length, and is the equivalent of walking briskly for about 90 minutes. [4]

Now a day's health is the most pertaining issue for all the human beings. Advancement in technologies and availability of modern gadgets have made human more lazy. He wants everything immediately on his table without taking much effort. This has lead to health issues and has caused increase in illness. In order to test hypothesis that effect of the time spent on exercise upon yearly illness frequency is negligible, we have done a sample survey of people in anlocalurban area.

MATERIALS AND METHODS

Primary data of sample size 688, of different gender, age, education and occupation, has collected by questionnaire method and simple random sampling is used.

The terms used in the paper are defined below:

Exercise: "Exercise is physical activity that is planned, structured, and repetitive for the purpose of conditioning any part of the body. Exercise is used to improve health, maintain fitness and is important as a means of physical rehabilitation." [5]

Illness: A disease or period of sickness affecting the body or mind. [6]

Illness Frequency: Number of times, body is getting affected due to disease or sickness.

Hypothesis: An idea or explanation for something that is based on known facts but has not yet been proved. [7]

Logistic regression: "It is the appropriate regression analysis to conduct when the dependent variable is dichotomous (binary). Like all regression analysis, the logistic regression is a predictive analysis. Logistic regression is used to describe data and to explain the relationship between one dependent binary variable and one or more metric (interval or ratio scale) independent variables". [8]

To test the effect of time spent on exercise upon illness frequency, we have categorized the response as either 0 or 1. It's value is 1 when illness frequency > 5 and it is zero when illness frequency < 5. Thus binary logistic regression analysis is appropriate to investigate the addressed problem.

In questionnaire survey, we found that 285 individuals have illness frequency>5 and 403 individuals are with illness frequency< 5.Logistic regression analysis is done by using MINITAB software at 5% level of significance.

Statistical Analysis:

Our testing hypothesis is

H_0: the coefficient associated with predictor (time spent on exercise) equal to zero

Versus

$H_{1:}$ the coefficient associated with predictor (time spent on exercise) not equal to zero

Logistic Regression Table

Predictor	Coefficient	Standard Error coefficient	Z	P	Odds Ratio	95% CI (Confidence Interval)
Constant	-0.0328090	0.172919	-0.19	0.850		
Time spent on exercise	-0.0052424	0.0026054	-2.01	0.044	0.99	0.99 , 1

From the output, it is seen that the estimated coefficients for time is -0.005 indicating that if you spend more time on exercise illness frequency decreases.

G statistic tests

G = 4.133, DF = 1, p-Value = 0.042

In this case, G = 4.133, with a p-value of 0.042, indicating that there is sufficient evidence that the coefficients is different from zero. That is time spent on exercise affects illness frequency.

Goodness-of-Fit Tests

A **goodness-of-fit test,** in general, refers to measuring how well do the observed data correspond to the assumed model. Measures of goodness of fit typically summarize the discrepancy between observed values and the values expected under the model in question.

Method	Chi square	DF	P
Pearson	17.5664	18	0.485
Deviance	20.0168	18	0.332
Hosmer-Lemeshow Brown:	0.4292	2	0.807
General Alternative	0.3038	2	0.859
Symmetric Alternative	0.2721	1	0.602

The goodness-of-fit tests, with p-values ranging from 0.332 to 0.859, indicate that there is sufficient evidence to claim that the model fits the data adequately.

Measures of Association (Between the Response Variable and Predicted Probabilities)

Pairs	Number	Percent	Summary Measures
Concordant	45928	40.0	SomersD 0.08
Discordant	37217	32.4	Goodman-Kruskal Gamma 0.10
Ties	31710	27.6	Kendall's Tau-a 0.04
Total	114855	100	

The table of concordant, discordant, and tied pairs is calculated by pairing the observations with different response values. Here, we have 285 individuals with illness

freq >5 and 403 individuals with illness freq <5, resulting in 285*403 = 114855 pairs with different response values. Based on the model, a pair is concordant if the individual with a illness freq >5 has a higher probability of having illness freq>5, discordant if the opposite is true, and tied if the probabilities are equal. In this example, 40% of pairs are concordant and 32 are discordant.

CONCLUSION

From analysis it is clear that our hypothesis is rejected at 5% level of significance that is the coefficient associated with predictor (time spent on exercise) may not equal to zero.

From the output, it is also seen that the estimated coefficients for time is -0.005 indicating that if you spend more time on exercise illness frequency decreases .

Somers' D, Goodman-Kruskal Gamma, and Kendall's Tau-summaries of the table of concordant and discordant pairs. These measures most likely lie between 0 and 1 where larger values indicate that the model has a better predictive ability. In this case, the measure ranges from 0.04 to 0.1 which implies less than desirable predictive ability.

Limitations: As it was a pilot study we did not focus on age group and gender of collected sample.

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