Physio 12

Example Lab Report

Presented here is an example of a laboratory write-up (lab report). In the lab manual is a detailed explanation of what we are looking for in each section. This paper is to demonstrate how some of these points that we talk about in the lab manual look on paper. This particular paper received a "23/25" points. It was chosen because it is a very good example of what we are looking for. There are some places it could be improved upon, however. Look it over and talk to us (the instructors) about questions you may have about it.

Circadian rhythms in pulmonary vital capacity in nonasthmatic adults

Written by Ms. A. Goodstudent

Comment: Student from Dr. Reyes course.

Abstract

While diurnal fluctuations are well-known and treated in asthmatic patients, among whom nocturnal wheezing is common, studies of pulmonary function in healthy humans rarely take this variability into account. The question posed in the present paper is whether the 24-hour rhythm will be detectable through a comparison of pulmonary function measurements taken at midday and similar measurements taken in the late evening. Based on the findings of other researchers, what is expected is that tidal volume (TV) will be appreciably greater among measurements taken at midday. .Measurements of 22 healthy subjects ages 19-37 were taken between 11 a.m. and 2 p.m., and measurements of 12 other healthy subjects ages 21-42 were taken between 7 p.m. and 10 p.m. Measurements of TV, IRV, ERV, and subsequent calculations of vital capacity in the daytime and evening lab sections included here showed a difference, with the daytime lab section showing a generally higher set of volumes and vital capacity. When predicted VC is accounted for (difference=0.54L), the difference in mean TV between groups (.17L) is negligible. Of interest is the significant difference in VC (.98L). Further study is clearly necessary.

Introduction

Like human body temperature and metabolism, the pulmonary system demonstrates a patterned fluctuation in function over roughly a 24-hour period (4,5,6,7,8). While diurnal fluctuations are well-known and treated in asthmatic patients, among whom nocturnal wheezing is common, studies of healthy humans rarely take this variability into account (7,8). A number of papers

Comment: There are proper citations linking relevance to supporting scientific evidence/literature. These need to correspond to citations in the bibliography.

have aimed to correct this disparity, investigating daily oscillations in pulmonary ventilation (5), noting this pattern's apparent independence with respect to circadian rhythms in core body temperature (5,7).

Comment: The relevance of the hypothesis is clearly explained. It should also be pointed out that this part of the paper does not have to be incredibly lengthy. The comments are to the point.

The purpose of this paper is to consider measurements of pulmonary function in nonasthmatic adults in light of the circadian patterns described in other studies. The question posed is whether the 24-hour rhythm will be detectable through a comparison of pulmonary function measurements taken at midday and similar measurements taken in the late evening. Based on the findings of other researchers, what is expected is that tidal volume (TV) will be appreciably greater among measurements taken at midday.

Comment: Clear, precise, and testable hypothesis

Methods and Materials

Comment: •The paper clearly explains what equipment was used.

Utilizing BIOPAC student lab software and BIOPAC spirometric equipment, students in separate lab sections took measurements of tidal volume (TV), inspiratory reserve volume (IRV), and expiratory reserve volume (ERV). Also gathered from subjects was information including age, gender, height and information about known pulmonary disorders. Measurements of 22 subjects ages 19-37 were taken between 11 a.m. and 2 p.m., and measurements of 12 other subjects ages 21-42 were taken between 7 p.m. and 10 p.m. The two groups were controlled for asthma and other pulmonary dysfunctions. This control necessitated the omission of two subjects' data collected during the evening lab.

Comment: •The paper clearly explains who or what the subjects were.

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To allow for measurements to be taken, subjects breathed through a disposable mouthpiece into an airflow transducer while wearing nostril clips that forced subjects to breathe entirely through the mouth. Each subject performed a series of breaths into the airflow transducer for measurement while being coached by a fellow classmate. The series included normal breathing for three cycles (cycle=inhale and exhale), an inhalation to maximum capacity, three more normal cycles, maximum exhale, and a return to normal breathing. Vital Capacity was predicted for each subject using

Comment: •The paper clearly explains procedures used and the information in methods sufficient for replication

formulas in which height and age are plugged in with coefficients. These calculations were recorded as "Predicted Vital Capacity."

Comment: •The methods section is written in the proper grammar and tense. From the methods is it clear how the data used for the results were collected

Results

Measurements of TV, IRV, ERV, and subsequent calculations of vital capacity in the daytime and evening lab sections included here showed a difference, with the daytime lab section showing a generally higher set of volumes and vital capacity. Measurements shown are in Liters.

Comment: •The graphs/figures/tables are accompanied by text that clarifies the numeric relationship, without and significant interpretation. However, the person lost points for using the words "higher". This is an imprecise term. It is more appropriate to indicate how high (30% higher or larger).

Comment: •The graphs/figures/tables are clearly labeled
Do the graphs/figures/tables clearly illustrate answer to hypothesis

Measurements taken 11a.m.-2p.m.
19 females, 3 males; age range 19-37

Subject	TV	IRV	ERV	VC	Predicted VC	% of Predicted
1	0.81	1.84	2.00	4.65	4.04	115%
2	0.70	1.80	1.31	3.81	4.25	90%
3	0.77	1.01	0.65	2.43	3.29	74%
4	0.50	1.39	0.99	2.87	3.29	87%
5	1.58	2.12	0.84	4.54	4.55	100%
6	0.74	1.45	0.53	2.72	3.68	74%
7	1.13	0.91	0.79	2.83	3.11	91%
8	0.65	1.14	1.34	3.13	2.63	119%
9	1.10	1.66	0.87	3.63	3.53	103%
10	0.58	2.67	1.72	4.92	3.75	131%
11	1.06	3.22	1.00	5.28	4.05	131%
12	1.24	1.95	0.38	3.57	3.52	101%
13	0.31	1.24	0.94	2.49	3.00	83%
14	0.57	1.47	0.85	2.89	3.76	77%
15	0.37	0.69	0.57	1.63	3.91	42%
16	0.80	2.04	0.73	3.57	3.52	101%
17	1.05	0.67	2.39	4.10	3.49	117%
18	0.58	1.06	0.67	2.31	3.33	69%
19	0.49	1.21	0.44	2.14	3.60	59%
20	1.45	0.85	1.88	4.18	4.74	88%
21	0.82	1.39	0.54	2.75	4.02	68%
22	0.53	2.54	2.04	5.11	4.88	105%
Mean	**0.81**	**1.56**	**1.07**	**3.43**	**3.72**	**92.11%**

Measurements taken 7p.m.-10 p.m. 6 females, 4 males; age range 21-42						
Subject	TV	IRV	ERV	VC	Predicted VC	% of Predicted
1	1.03	1.60	1.26	2.63	3.40	77%
2	0.98	2.57	0.28	3.83	4.15	92%
3	0.65	0.53	0.16	1.13	3.15	36%
4	0.48	1.25	1.38	3.11	4.76	65%
5	0.40	1.52	0.91	2.83	4.03	70%
6	1.23	1.39	0.58	3.19	4.82	66%
7	0.78	1.62	1.00	3.41	2.80	122%
9	0.56	1.58	0.90	3.04	3.04	100%
10	0.81	2.33	0.39	3.53	4.83	73%
11	0.74	1.29	0.67	2.69	3.23	83%
Mean	**0.64**	**1.31**	**0.63**	**2.45**	**3.18**	**65.45%**

Comment: •The graphs/figures/tables give a strong indication of the answer to hypothesis

Discussion

At first glance there appears to be a significant difference in the data, and that the difference supports the hypothesis that measurements taken in the evening would reflect the downward trend of TV that is thought to occur in most humans, independent of activity (1,7,8). While this difference can be explained by a number of factors other than circadian rhythm, it is significant enough to incite curiosity about whether this would hold up to further examinations.

Comment: •The results are explained in the context of the current scientific knowledge (citations, ect.).

It is important to compare the mean predicted vital capacities of the two groups, and to view the rest of the mean data in light of this difference. Because predicited vital capacity calculations take into account variables that are thought to present absolute differences in lung function between subjects studied. When predicted VC is accounted for (difference=0.54L), the difference in mean TV between groups (.17L) is negligible. Of interest is the significant difference in VC (.98L).

Comment: The further implications of this experiment discussed to some extent in this paper. However, more could have been added. A point was taken for this reason.

Comment: The relevance of the data to the hypothesis is clearly explained.

Further study is clearly necessary. Missing from the present data are measurements from individual subjects taken over the course of the day for a minimum of two weeks. Also useful to this study for comparison with previous studies would be measurements of forced expiratory volume and rate of respiration.

Comment: The writer is aware of the experimental shortcomings

Literature Cited

1. Borsboom, Gerard J. J. M., Wilfrid van Pelt, Hans C. van Houwelingen, Ben G. van Vianen, Jan P. Schouten, and Philip H. Quanjer. 1999. Diurnal variation in lung function in subgroups from two Dutch populations: consequences for longitudinal analysis. **American Journal of Respiratory Critical Care Medicine.** 159:1163-1171.

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Comment: •The overall use of language, Objectivity, Grammar, Quality of science writing, and Depth of paper was very good.

Comment: •The Title, bibliography, Section formatting was excellent.