EFFECTS OF FASTING ON MALE FERTILITY USING ALBINO WISTAR RATS

BY

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A PROJECT SUBMITTED TO THE DEPARTMENT OF PHYSIOLOGY, SCHOOL OF BASIC MEDICAL SCIENCES IN PARTIAL FULFILLMENTS FOR THE AWARD OF BACHELOR OF SCIENCE, B.Sc. (HONS) PHYSIOLOGY OF THE UNIVERSITY OF BENIN, BENIN CITY.

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CERTIFICATION

We the undersigned hereby certify that **Miss. OSUNDE Oghosa Sharon** with matriculation number **BMS1602004** carried out this work titled '**EFFECT OF FASTING ON MALE FERTILITY USING ALBINO WISTAR RATS'**, in the Department of Physiology, School of Basic Medical Sciences, University of Benin, Benin City and we approve same as adequate in scope and quality for the award of Bachelors of Science Degree (B.Sc.) in Physiology.

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DEDICATION

This project is dedicated to God Almighty for sustenance, wisdom and direction; I owe it all to him. I am also dedicating it to the Department of Physiology, School of Basic Medical Sciences, University of Benin, for the 4years spent so far in Learning, both in good times and in seemingly frustrating periods as well. Without this body, I would not have a reason to write this piece of work.

ACKNOWLEGEMENT

I want to say a very big thank you to God Almighty for his Love and sustenance all through the period of my existence.

I acknowledge my supervisor, Prof. F. Agoreyo for guiding me from the start till the successful completion of this project work. I sincerely acknowledge him for extending his valuable guidance, critical reviews of the project procedures and above all the moral support he provided throughout this period. May God bless you Sir.

I also want to acknowledge my parents, Mr. and Mrs. Osunde for their love, care, prayers and financial support, I could not have asked for better parents.

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Finally I would like to appreciate my Physiology family, people who made the entire journey of 4years memorable and worthwhile. God bless you all for your invaluable contributions.

To Google Scholar, you remain my one true friend and you were ever present in my time of need.

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ABSTRACT

Fasting is a deliberate abstinence from normal meal(s) i.e. food and drinks, or failure to eat/drink for an unusual length of time. It is a common practice in Nigeria and other parts of the world by various groups and for various reasons ranging from spiritual, health, to experimental purposes. This study was aimed at evaluating the effect of fasting the sexual performance of male Wistar rats. Eighteen (18) adult wistar rats were randomly selected into a control group (group A) containing six (6) animals and two experimental groups (B and C) each containing six animals (n= 6 per group). Group A received normal rat feed and water, Group B were subjected to fasting for a period of six (6) hours per day for two weeks and Group C were subjected to fasting for a period of twelve (12) hours per day for two weeks. The result of this experiment showed that observable Teratozoospermia in Group B rats and Teratozoospermia with Asthenozoospermia in the Group C rats. Sperm cell count and liveability significantly decreased ($p<0.05$) in Group C rats. Sperm cell motility across the 3 groups of rats during this experiment showed statistically significant difference ($p<0.05$) in the progressive motility and of rats in Group A and Group C. In conclusion, the study showed that subjecting the rats to fasting for 6-Hours per day had little to no consequential effect whereas subjection of the rats to 12-Hours fasting per day greatly affected the sexual performance of the rats with varying clinical presentations.

CHAPTER ONE

INTRODUCTION

Fasting is a deliberate abstinence from normal meal(s) i.e. food and drinks, or failure to eat/drink for an unusual length of time. It is a common practice in Nigeria and other parts of the world by various groups and for various reasons ranging from spiritual, health, to experimental purposes. Fasting could take different forms and length. For instance, it could be total; where the subject abstains from all kinds of foods/drinks, it may also be partial, where the subject may only abstain from some kind of foods/drinks. On the length, fasting may take 12hrs, 24hrs, and as long as 72hrs. In human, when fasting lasts longer than 72hrs the individual becomes hypoglycaemic and could collapse as nearly all the glucose in his body may have been used up, causing the kidney and the liver to, by the process of gluconeogenesis, convert the non-carbohydrate food substances in the body, like fat and protein, to glucose to sustain the body. Fasting has various physiological effects on the body and may also have some effects on the gonadotropic hormone level and the testosterone level in fertile males, either via the hypothalamus pituitary-testicular axis or by direct effect on the testis, and could therefore affect spermatogenesis. The quality of spermatozoa is a significant determinant of male fertility. It is therefore important to determine what effect fasting has on the general quality of the semen (Seriki, *et al.*, 2015).

Sexual function is an important component of human quality of life and subjective well-being. Sexual problems are widespread and adversely affect mood, wellbeing, and interpersonal functioning (Rodjmark, 2017).

1.1 JUSTIFICATION OF STUDY

Fasting has been observed to have the ability to cleanse the body, reduce gonadotropin secretion and libido. Libido is another term for sex drive, which is a person's over all desire and ability to engage in sexual activity (Gregory, 2010). This study was aimed at evaluating the effect of fasting the sexual performance of male Wistar rats.

CHAPTER TWO

LITERATURE REVIEW

2.1 FASTING

Fasting is a practice that involves a restriction of food or drink intake for any period. Fasting has been practiced for a variety of reasons that range from dieting to religious beliefs to medical testing. It is commonly used in medical practice for blood glucose and lipid markers laboratory tests to aid in the diagnosis of numerous diseases as well as assessing many risk factors. Variations of fasting have been studied for their ability to improve physiological indicators related to health. Some of these factors include insulin sensitivity, blood pressure, atherogenic lipids, body fat, and inflammation. Many of these studies involve those who participate in the Islamic tradition of Ramadan since participants abstain from food and drink each day from dawn until sunset for an entire month (Longo and Mattson 2014). The compiled results show a variety of metabolic and physiological adaptations that occur from fasting. From a general perspective, this includes the changes in metabolic pathways to create energy for the body.

2.1.1 DEVELOPMENT

One of the most heavily studied fasting regimens is known as intermittent fasting, which involves the restriction of caloric intake during a set period continually. Examples of fasting regimens include restriction of calories for 1 full day out of the week or 2 non-consecutive days, also known as the "5:2" diet. Animal studies have repeatedly demonstrated a vigorous, positive response of various health indicators to intermittent fasting regimens (Secor *et al.,* 2016). These include improved insulin sensitivity and a reduction of body fat, atherogenic lipids, blood pressure, and IGF-1. Animal models have also demonstrated a statistically significant improvement in the ability of intermittent fasting to delay the progression of neurological diseases including Alzheimer's, Parkinson's, and Huntington's disease (Longo and Mattson 2014). Human studies of intermittent fasting also demonstrate promising results in protection against metabolic syndrome and other lifestyle diseases including diabetes and cardiovascular disease (Tinsley and La-Bounty, 2015). A notable cellular process that is up regulated during times of fasting includes the inhibition of the tyrosine kinase enzyme. Inhibition of this enzyme is a backbone for the treatment of many types of cancer, and further research is necessary to evaluate whether fasting regimens can be used concomitantly with chemotherapy to improve patient outcomes (Caffa *et al.,* 2015).

2.1.2 ORGAN SYSTEMS INVOLVED

The most immediate organ affected by a fast is the pancreas. During times of low plasma glucose, the pancreas will release more glucagon from the alpha cells found in the islets of Langerhans. Glucagon will mainly affect the liver as it stores most of the glycogen in the body. Skeletal muscle is also affected by glucagon, but to a lesser extent since skeletal muscle contains a low glycogen concentration. After hepatic glycogen stores are depleted, the body uses adipose tissue and protein for energy. The liver has an active role in the metabolism of fats as it is the main oxidizer of triglycerides. In more extreme versions of fasting, where fat sources have been expended, the body breaks down skeletal muscle for energy. Catabolism of skeletal muscle provides the body with amino acids that can be metabolized. However, this process also leads to a reduction in muscle mass (Sanvictores *et al.*, 2020).

2.1.3 CLINICAL SIGNIFICANCE

Fasting is not only important for clinically relevant tests but also has the potential to be used as a treatment for some diseases in humans. One study (sample size of 6) has shown that intermittent fasting, combined with the ketogenic diet, can be successfully implemented in paediatric patients with epilepsy (Hartman *et al.*, 2013). However, current literature on the subject is still limited and numerous studies still need to be performed to show the actual clinical efficacy of fasting as a treatment for human neurological disorders (Phillip 2019). Recent data also suggests that larger clinical trials are warranted to further investigate the efficacy of prescribed fasting regimens for the treatment of chronic lifestyle and obesity-related diseases (Mattson *et al.*, 2017). Most studies related to fasting as a treatment for diseases have been based on animal models.

2.2 GENERAL BEHAVIORAL ASPECTS OF THE COPULATORY CYCLE IN RATS

The course of sexual interaction between a male and a female rat is to a large degree stereotypical (Chu and Agmo 2015). Broadly speaking, a copulation cycle can be divided into three parts, the pre-copulatory phase, copulatory phase and executive phase (Snoeren *et al.*, 2014). During the pre-copulatory phase, the male rat and the receptive female (i.e. being in hormonal or behavioural estrus) will engage in anogenital sniffing. The subsequent copulatory phase consists of the female drawing the male's attention with para-copulatory behavior: *hopping* (short jumps with all four legs off of the ground) and *darting* (short and sudden runaway movements, in which she presents her body to the male). In a reaction to these movements, the male rat will try to *mount* the female: he straddles the female from behind, and thrusts his hips in an attempt to locate the vagina with his penis. In the event of penile insertion into the vagina, the male rat continues his thrusting with a sudden deeper thrust. He then dismounts the female, visible as a short jump backwards, away from the female, sometimes raising his forepaws in the process. This behavior is recognized as an *intromission*. The physical stimulation caused by mounts and intromissions can cause the female to arch her back for easier vaginal entry, a receptive phenomenon known as *lordosis*. These behaviours tend to proceed in rapid succession, only to be intermitted by self-grooming, rest, and *pacing* by the female (runaway behavior). Finally, ejaculation constitutes the executive phase for the male, which is followed by a period of male inactivity, usually lasting around 5 minutes. The beginning of a new cycle of sexual behavior marks the end of the *post-ejaculatory interval.* Auditory, olfactory and visual cues play an important role in sexual behavior. Interestingly, a cooperative function seems to exist for the different modalities in the induction of approach behavior of a potential mate (Agmo and Snoeren 2017).

2.2.1 MALE RAT SEXUAL BEHAVIOR

Male rat sexual behaviour is characterized by a series of mounts, either with or without vaginal intromission that eventually will lead to ejaculation after a number of intromissions and certain duration of around 5–10 min. A distinction can be made between appetitive and consummatory aspects of copulatory behavior, where latency until the first mount putatively reflects some of the appetitive aspects and sexual motivation. Consummatory aspects of sexual behaviour include intromission latencies, ejaculation latencies, mount frequencies and intromission frequencies and may all affect ejaculatory behavior. With regard to male rat ejaculatory behavior, over the last decades numerous pharmacological studies have shown that various neurotransmitters and/or neuropeptides may be involved (Chu and Agmo 2015).

Penile stimulation through intromissions, with a minimum number of two, is essential for a male rat to reach ejaculation (Beck and Baily 2000). In addition, two or more intromissions are necessary for a female to get into progestational state, necessary to become pregnant (Adler 1969). Interestingly, rats that show innate short ejaculation latency do not necessarily need less intromission to achieve ejaculation (Pattij *et al.,* 2005). Moreover, there is a low variability in the temporal pattern of male rat sexual behavior (Agmo 1999), meaning that rapid ejaculators need less time to achieve the same amount of intromissions than normal and sluggish copulators. Indeed, normal and sluggish ejaculators show more mounts preceding ejaculation, essentially making rapid ejaculators more "efficient" than their sluggish and normal counterparts (Pattij *et al.*, 2005).

When we look at *mounts* in particular, it is difficult to establish what they really are. Are they failed intromissions? That is, is the "intention" of every mount to end in an intromission? Or, do they represent a behavior independently contributing to the copulation climax and/or do they serve a specific "purpose" within the sexual behavior? We have seen rats only intromitting and not mounting during an ejaculation series, which suggests that mounts are not necessary to reach ejaculation. It is clear, however, that mounts do contribute to the arousal state and facilitate ejaculation: when males mate with a female with a closed vagina for 40 minutes, less intromission are necessary to achieve ejaculation during subsequent mating with an intact female. In addition, the ejaculation latency and number of mounts are decreased during this subsequent mating (Hard and Larsson 1968). Mounting is also a self-maintaining behavior. Male rats continue to mount when they are prevented from intromitting through closure of the female vagina, or through local anaesthesia of the penis (Adler and Bermant and 1966). Intriguingly, although intromissions are the essential part of copulatory behavior leading to ejaculation, it is actually the mount bouts that determine the temporal pattern of copulation, independent of intromission behavior. This became evident from a study showing that the inter-mount-bout-interval (the time from the first mount of one mount bout to the first mount of the next mount bout) was highly constant, independent of whether the preceding mount bout ended in a mount or an intromission. In addition, male rats do not keep mounting within a mount bout until they have achieved an intromission, suggesting that the mount bout is not "intromission driven" (Sachs and Barfield 1970). This proves that mounts are not just nonessential behaviours for reaching ejaculations, but central behaviours within the sexual behavior pattern of the male rat.

2.2.2 BEHAVIORAL PARADIGMS

Sexual behavior of the male rat is most often assessed by putting the male rat in a transparent test arena together with a receptive female rat. In this set-up, the male has continuous access to the female and can freely copulate at his own chosen pace. It is important to let the test subject pace the copulation, because copulation is only rewarding to the rat that is able to control the mating (Martinez and Paredes 2001). This is also illustrated by the fact that the structure of male copulation behavior in a semi-natural environment, where females are capable of pacing the copulation, differs from that in a copulation test (Chu and Agmo 2015). Often, the copulation test is conducted for one ejaculation series, ending after the first intromission after the post-ejaculatory interval. Alternatively, the test can be ended after a predefined time period (usually 30 minutes), independent of the amount of ejaculation series the rat has shown. Sometimes, rats are tested up until exhaustion.

In general, all significant differences among groups can be identified by only looking at the data for the first ejaculation series, except for the number of ejaculations within a defined period of time. Still, the effect of an increase in the number of ejaculations will logically be accompanied by decreased ejaculation latency and/or a shortened post-ejaculatory interval, and would therefore automatically be reflected in the data from the first ejaculation series. However, although it might not be expected, treatment effects could also only become evident in later ejaculatory series. For example, the ejaculation latency in the first series may remain normal, while it is affected in the following series. Therefore, we recommend to always conduct a 30 min test, if only to rule out this possibility. While the focus of data analysis will lie with the first series, we might come across something unexpected in any of the following series. Additionally, Chan et al. (2010) discussed an interesting argument in favour of the 30-minute test: when testing pharmacologically active substances, a 30 minute time period will control for individual difference in pharmacokinetics better than a single ejaculation series test (Chan *et al.*, 2010).

CHAPTER THREE

MATERIALS AND METHOD

3.1 MATERIALS

During the course of this study, the following materials, apparatus or chemical reagents were used;

- Hand gloves
- 5ml syringes
- Chloroform
- Formalin
- Cover Slips
- Dissecting set
- EDTA sample bottles
- Plain sample bottles
- Light microscope
- Micropipette
- Petri dish
- Incubator
- Improved Neubauer Haemocytometer
- Surgical Scissors
- Cotton wool

- Hand counter
- Weighing balance

3.1.1 EXPERIMENTAL ANIMALS

Eighteen (18) adult wistar rats with an average weight of 200g were used for this study. The animal were purchased and maintained in the animal house of the Department of Anatomy, School of Basic Medical Sciences, College of Medical Sciences, University of Benin, Benin City. They were kept in cleaned cages, maintained at room temperature with 12hours light and dark cycle and also allowed free access to drinkable water and rat feed ad libitum. The animals were acclimatized for a period of two weeks to the laboratory conditions prior to the commencement of experiment at the animal house of the Department of Anatomy.

3.1.2 SAFETY PRECAUTIONS OBSERVED

- Use of complete laboratory suits and protective gloves while working in the laboratory to avoid skin contact with any apparatus/chemicals was strictly adhered to.
- Proper glove removal technique was implored to avoid skin contact with any chemicals.
- Hands were washed regularly with soap and disinfectant before breaks and at the end of every workday.

3.1.3 EXPERIMENTAL DESIGN

Eighteen (18) adult wistar rats were randomly selected into a control group (group A) containing six (6) animals and two experimental groups (B and C) each containing six animals (n= 6 per group). The animals in each cage were given Growers' mash, manufactured by Premier Feed Mills co Ltd (a subsidiary of flour mills of Nigeria Plc.) and water. The experimental design is shown as follows;

Group A: Control group, received normal rat feed and water.

Group B: Animals in this group were subjected to fasting for a period of six (6) hours per day for two weeks.

Group C: Animals in this group were subjected to fasting for a period of twelve (12) hours per day for two weeks.

3.2 METHOD

During sacrifice, the final weight of the rats was taken using a compact electronic weighing scale. After taking the final weights, the rat was put into an enclosed container with Cotton wool and about 50ml of chloroform for anaesthetizing. After about 2-3 min inside the enclosed container it was brought out and placed on a dissection table in supine position. Abdominal thoracic incision was made with dissection scissors and surgical blade to expose the abdominal viscera. 5ml syringe was used through cardiac and arterial puncture for blood collection into lithium heparin bottles EDTA bottles for analysis. Thread was used to litigate the two sides of vas deferens to be able to collect semen for sperm analysis. Also the caudal portion of their left epididymis removed, crushed and prepared for sperm count. The semen is diluted with normal saline solution and observed at 40x, 100x and 400x using a light microscope.

3.2.1 PROCEDURE FOR SPERM CELL COUNT

A special cover-slip provided with the counting chamber of the haemocytometer was properly positioned on the surface of the chamber. Usually, when the two glass surfaces are in proper contact, Newton’s rings can be observed. Then the semen suspension is applied to the edge of the cover-slip to be sucked into the void by capillary action which completely fills the chamber with the sample. The number of cells in the chamber can be determined by direct counting using the light microscope, and visually distinguishable cells can be differentially counted. The number of cells in a chamber is used to calculate the concentration or density of the cells in the mixture the sample was drawn from. It is the number of cells in the chamber divided by the chamber's volume, which must have been taken at the commencement of the experiment, taking into account of any dilution and counting shortcuts (Strober 2001).

$$\text{concentration of cells in original mixture} = \left(\frac{\text{number of cells counted}}{(\text{proportion of chamber counted})(\text{volume of chamber})}\right)\left(\frac{\text{volume of sample dilution}}{\text{volume of original mixture in sample}}\right)$$

3.2.2 STATISTICAL ANALYSIS

Data were entered into the Microsoft Excel spread sheet (v.10) prior to descriptive analysis. The data were represented as mean ± SEM. The data were analysed using the Duncan's multiple range analyses of variance, ANOVA (*P > .05, **P > .01 and ***P > .001) and correlation analyses were done using the Pearson's correlation (p ¼ .05) of the Statistical Package for Social Sciences, SPSS®, Version 21.0, IBM Corp., Armonk, NY, USA.

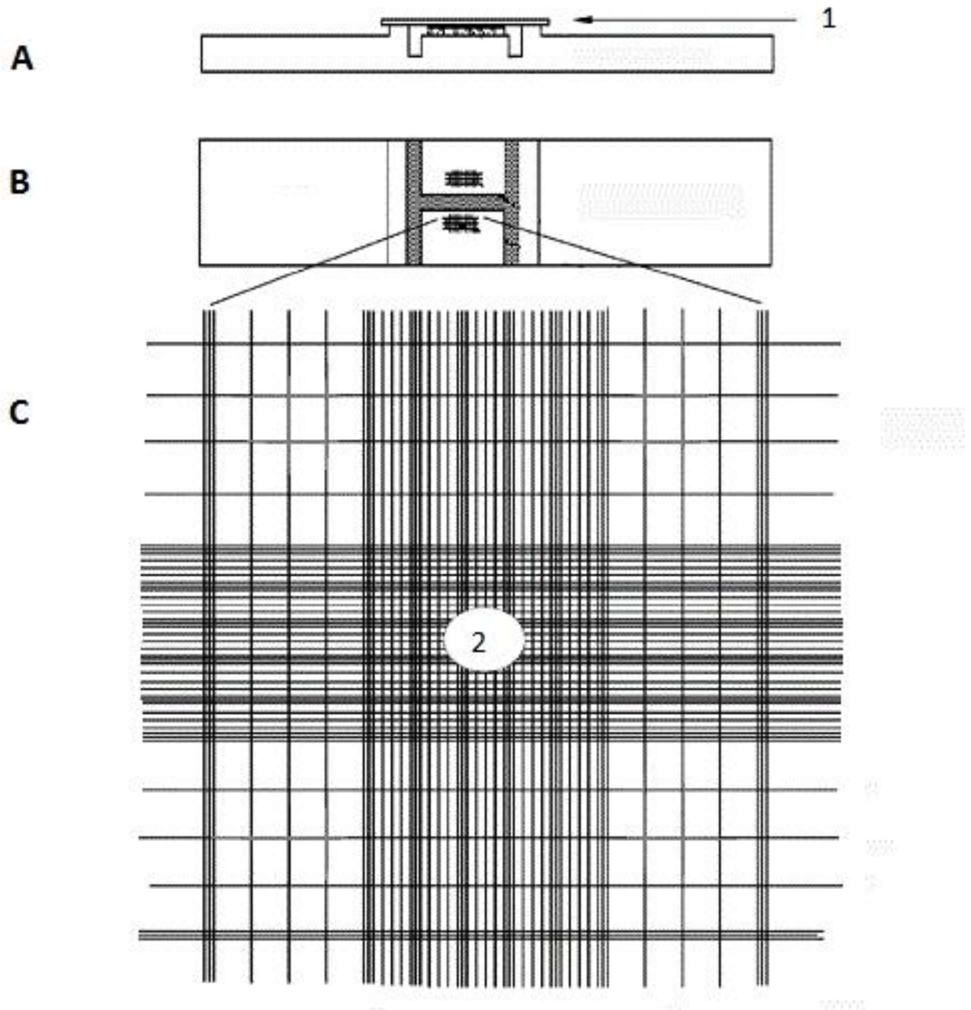


Figure 3.1: Haemocytometer. **(A)** Side view (cover glass shown by 1). **(B)** Top view. **(C)** One of the counting chambers (One of the 25 large squares shown by 2) (Strober 2001).

CHAPTER FOUR

4.1 RESULTS

Table 4.1: Showing the values for the sperm analysis parameters on each group of rat.

	TOTAL SPERM CELL COUNT	PROGRESSIVE MOTILITY	NON PROGRESSIVE MOTILITY	IMMOTILE	PERCENTAGE LIVEABILITY
GROUP A					
1	470	60	20	20	80
2	480	70	20	10	80
3	460	60	20	20	80
4	480	50	30	20	80
5	500	60	10	30	70
GROUP B					
1	540	70	10	20	80
2	480	70	10	20	80
3	500	60	20	20	80
4	470	20	40	40	60
5	480	50	20	30	70
GROUP C					
1	380	30	10	60	40
2	480	60	10	30	70
3	470	20	20	60	40
4	490	10	20	70	30

KEY: TOTAL SPERM CELL COUNT= X10^6CELLS/mm^3, MOTILITY= Percentage %,

Table 4.1 Cont'd

	NORMAL MORPHOLOGY	ABNORMAL MORPHOLOGY
GROUP A		
1	90	10
2	90	10
3	90	10
4	95	05
5	90	10
GROUP B		
1	80	20
2	80	20
3	80	20
4	80	20
5	90	10
GROUP C		
1	80	20
2	80	20
3	80	20
4	90	10

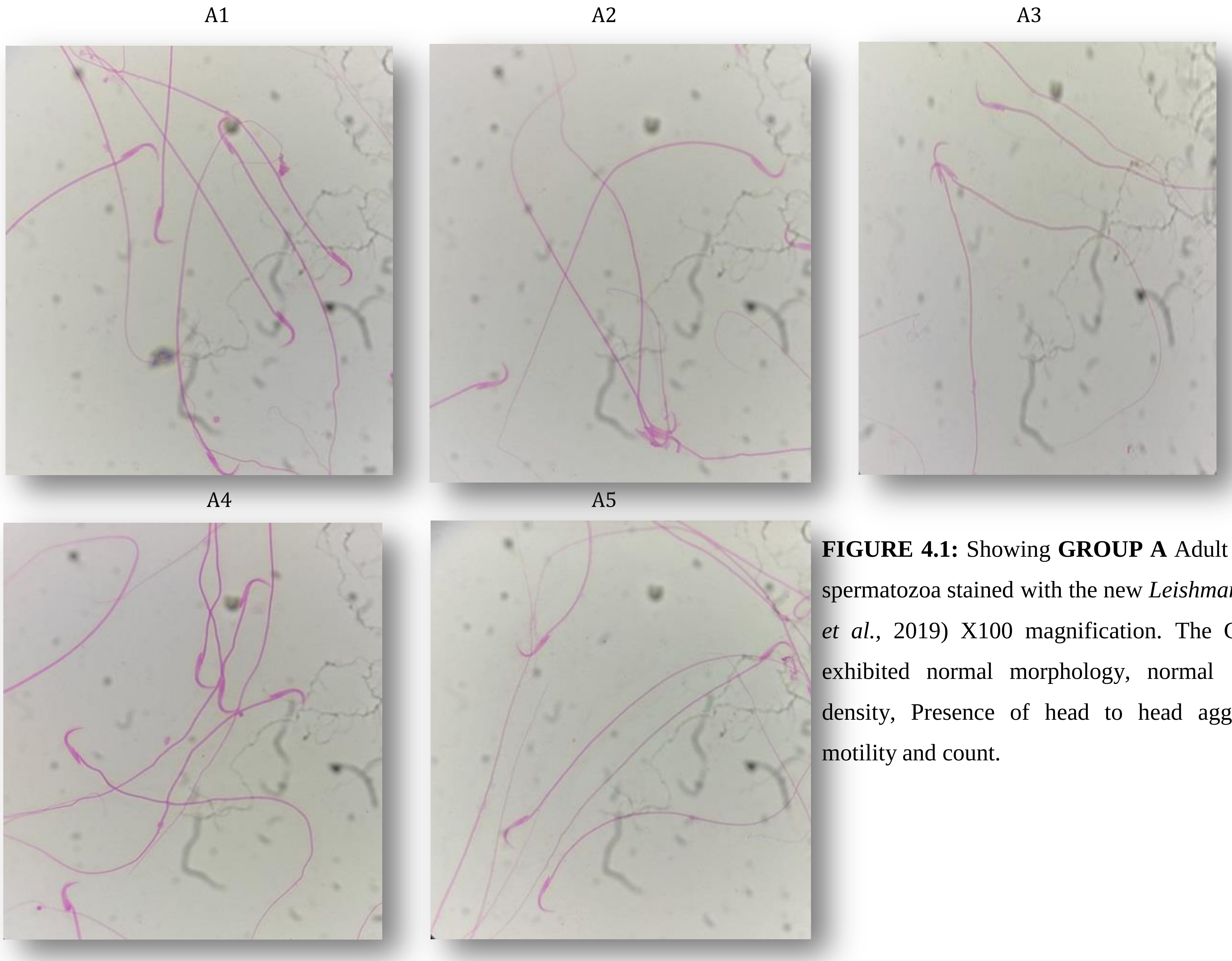
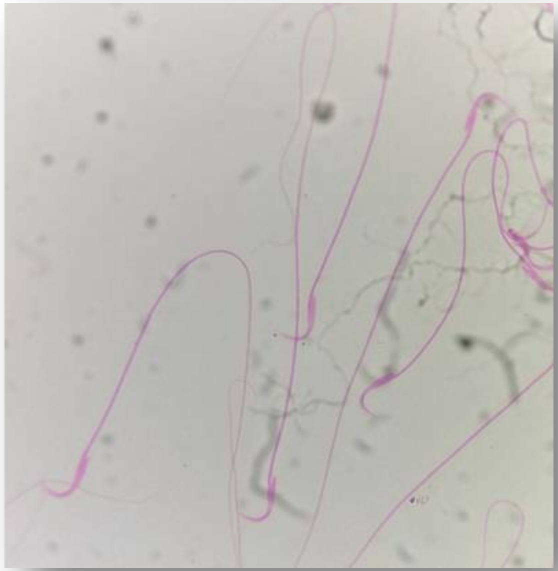
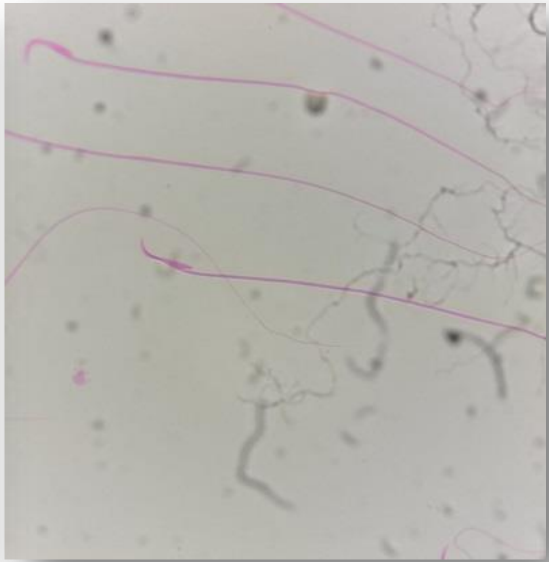


FIGURE 4.1: Showing **GROUP A** Adult Male wistar rat's spermatozoa stained with the new *Leishman and Eosin* (Ibeh *et al.*, 2019) X100 magnification. The Control Group A exhibited normal morphology, normal Size, shape and density, Presence of head to head aggregation, normal motility and count.

B1



B2



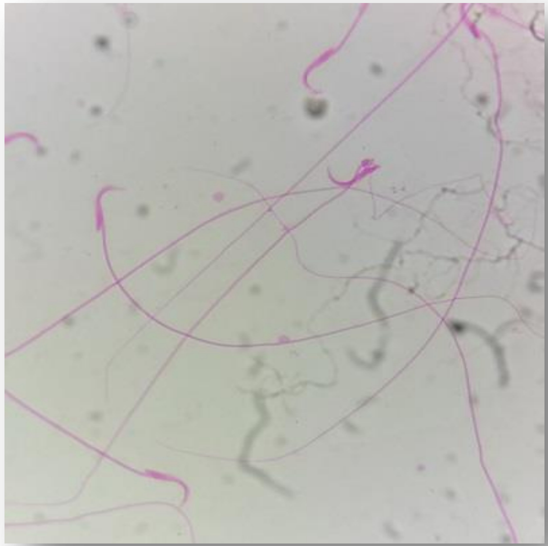
B3

B4

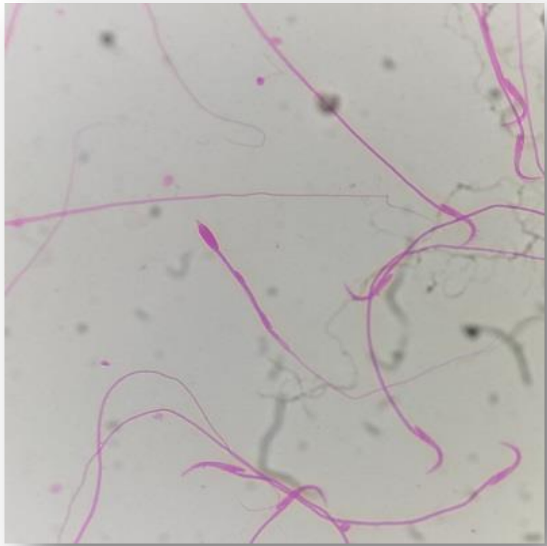
B5

FIGURE 4.2: Showing **GROUP B** Adult Male wistar rats' spermatozoa stained with the new *Leishman and Eosin* (ibeh *et al.*, 2019) X100 magnification. There is an observable mild to moderate teratozoospermia (B2,B3, B4 and B5) (Bent head, tailless and headless forms), normal motility and count.

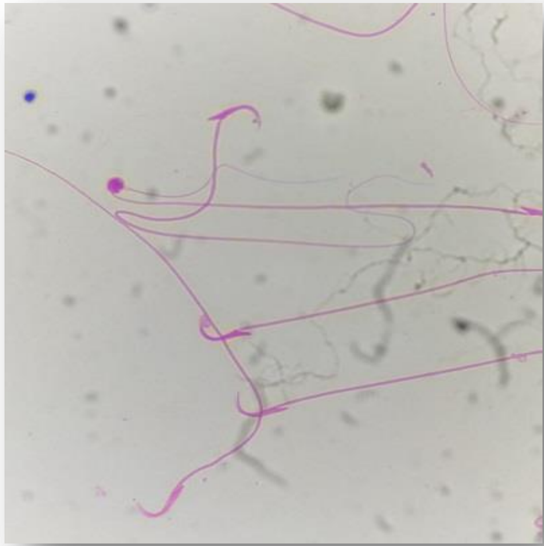
C1



C2



C3



C4

FIGURE 4.3: Showing **GROUP C** Adult Male wistar rats spermatozoa stained with the new *Leishman and Eosin* (Ibeh *et al.*, 2019) X100 magnification. Observable teratozoospermia (C1, C2, C3) (Bent head, Deformed head, bulgy head, bent body) with Asthenozoospermia (C3 and CA), normal motility and count.

4.2 STATISTICAL ANALYSIS OF RESULT

Table 4.2: Morphology of Sperm cells Statistical results.

GROUPS	NORMAL MORPHOLOGY	P-VALUE
A	91.00±2.24	1.000
B	82.00±4.47	0.809
C	66.00±37.15	0.229

GROUPS	ABNORMAL MORPHOLOGY	P-VALUE
A	9.00±2.24	1.000
B	18.00±4.47	0.094
C	14.00±8.94	0.435

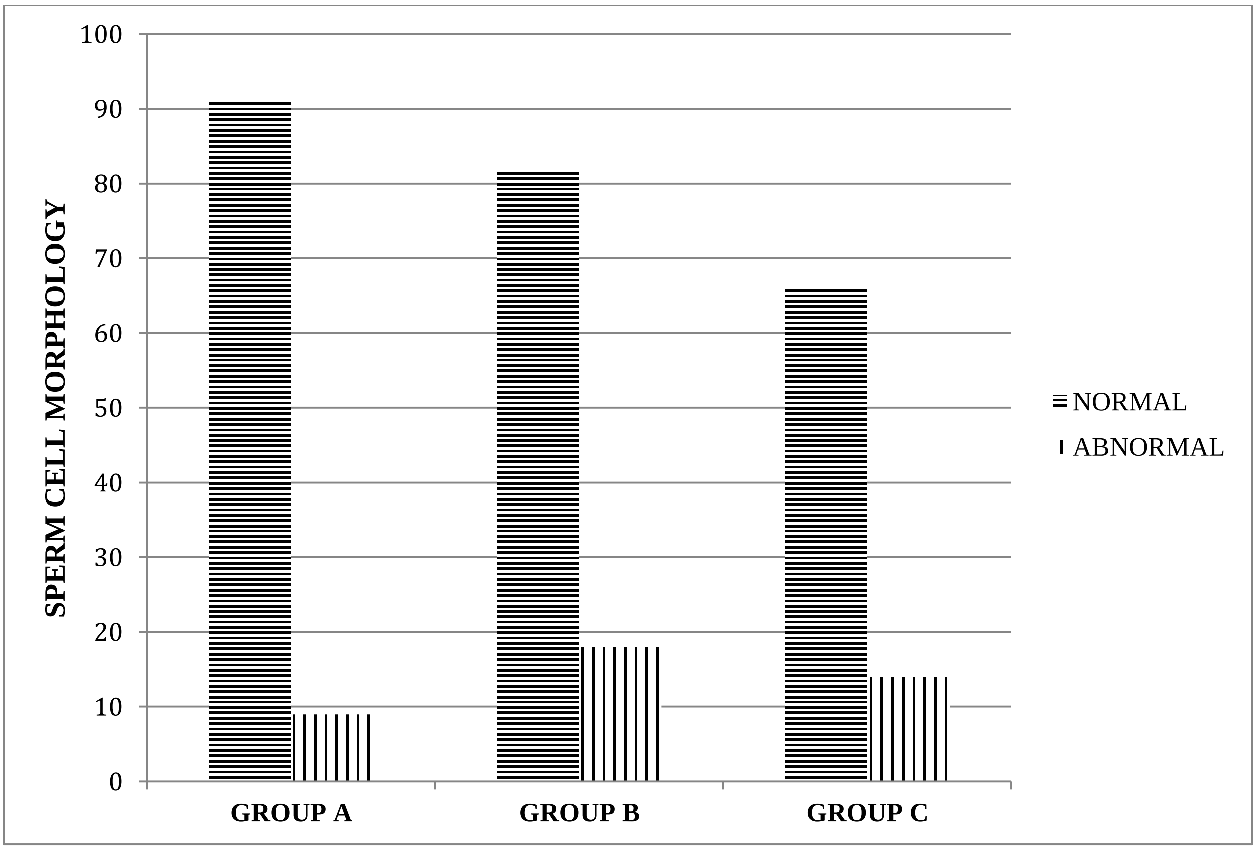


Figure 4.4: Graph of Morphology of Rat sperm cells

Table 4.3: Sperm cells Motility Statistical results.

GROUPS	IMMOTILE SPERM CELLS	P-VALUE
A	20.00±7.07	1.000
B	26.00±8.94	0.870
C	44.00±28.81	0.148

GROUPS	NON-PROGRESSIVE MOTILITY	P-VALUE
A	20.00±7.07	1.000
B	20.00±12.25	1.000
C	12.00±8.37	0.437

GROUPS	PROGRESSIVE MOTILITY	P-VALUE
A	60.00±7.07	1.000
B	54.00±20.74	0.876
C	24.00±23.02	0.029**

**C group showed statistically significant difference from control group (Group A)

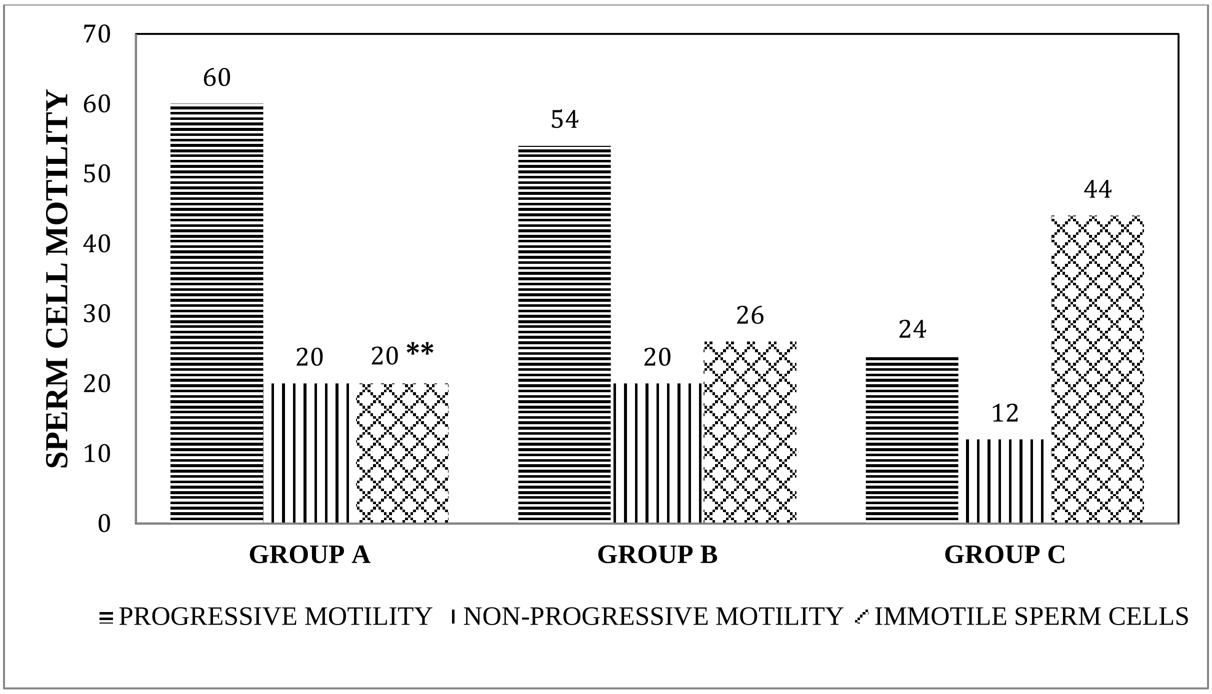


Figure 4.5: Graph of Sperm Motility of Rat sperm cells.

Table 4.4: Sperm cells Liveability Statistical results.

GROUPS	SPERM CELL LIVEABILITY	P-VALUE
A	78.00±4.47	1.000
B	74.00±8.94	0.922
C	36.00±25.10	0.004**

**C group showed statistically significant difference from control group (Group A)

GROUPS	TOTAL SPERM CELL COUNT	P-VALUE
A	478.00±14.83	1.000
B	494.00±27.93	0.979
C	364.00±208.16	0.364

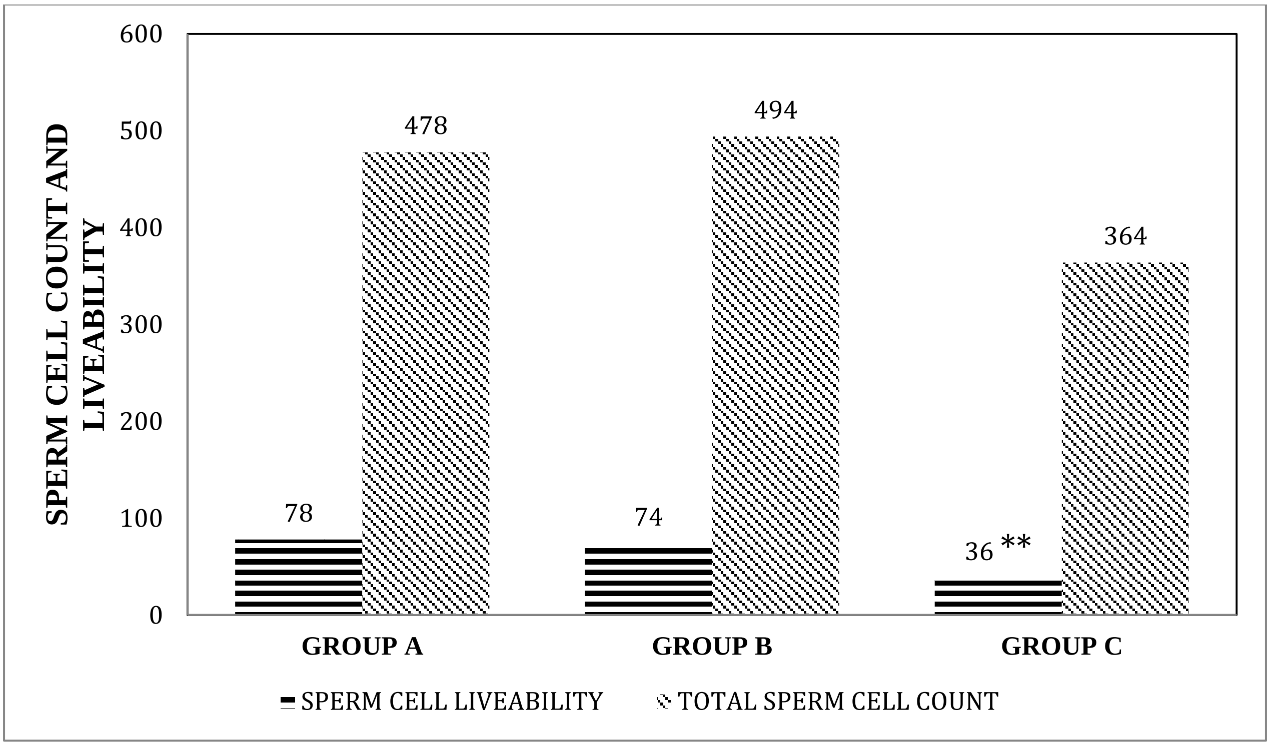


Figure 4.6: Graph of Sperm Liveability and Total Sperm Cell Count

CHAPTER FIVE

5.1 DISCUSSION

Sexual function is an important component of human quality of life and subjective well-being (Laumann *et al.,* 1999). From the morphology results obtained from this experiment via the microscopic analysis there was observable mild to moderate Teratozoospermia in the samples obtained from the Group B rats and albeit extensive presence of Teratozoospermia with Asthenozoospermia in the Group C rats in contrast to the samples from Group A rats (Control group) that exhibited relatively normal morphology (normal size, shape and density, presence of head to head aggregation and normal count). This results is somewhat similar to Seriki *et al.,* who observed that about 40% of the sperm cells of the fasted group were deformed (while some were decapitated, others had their flagella coiled around their heads) as against the 5% of deformation noticed in the fed/control group (Seriki *et al.,* 2015).

Sperm cell motility across the 3 groups of rats during this experiment showed statistically significant difference ($p<0.05$) in the progressive motility and of rats in Group A and Group C. An extensive increase in the amount of immotile sperm cells in Group C than in any other Group was also observed. These findings were similar to Seriki *et al.,* but relatively different from Omolaso *et al.,* who reported an insignificant decrease ($p>0.05$) in sperm motility of rats in the fasted group attributing it to the maintenance of glucose level within normal range throughout the 65 days of fasting in the two groups of animals used in the study (Seriki *et al.,* 2015; Omolaso *et al.,* 2012).

Sperm cell count showed a non-statistical decrease ($p>0.05$) in Group C compared to both Groups A and B which is at variance with the findings of Omolaso *et al.,* who reported significantly reduced ($p<0.05$) in both 12hrs and 24hrs fasted rats indicating a drop in cellular turnover as a result of inhibition of spermatogenesis or cellular regression after fasting (Omolaso *et al.,* 2012).

Sperm cell liveability results showed significant statistical decrease ($p<0.05$) in Group C thus indicating that fasting ultimately affected the sperm cell viability. This result defers from Omolaso *et al.,* who reported that sperm viability of the fasted groups show no significant deviation ($p>0.05$) from what was obtained in the control group and the sperm cells ratio were within the same range as those of the control rats (Omolaso *et al.*, 2012) but is in agreement with Seriki *et al.,* who reported that Sertoli cells may have been compromised by the prolonged fasting (nutrient deprivation), thereby resulting in decreased sperm count, impaired motility, and deformation in sperm cells (Seriki *et al.,* 2015).

5.2 CONCLUSION

In conclusion, the study showed that subjecting the rats to fasting for 6-Hours per day had little to no consequential effect on the sexual performance of the rats except for the presence of mild Teratozoospermia whereas subjection of the rats to 12-Hours fasting per day greatly affected the sexual performance of the rats with clinical presentations like Teratozoospermia with Asthenozoospermia, decreased sperm cell liveability, sperm cell count and motility as well as various morphological alterations of the sperm cells.

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