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EFFECT OF HIGH FREQUENCY RADIATIONS FROM 4G CELL PHONE ON SOME BIOCHEMICAL ASPECTS OF DEVELOPING CHICK EMBRYO

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ABSTRACT

In today's modern world, mobile phones are essential tool for communication and other purposes. The mobile phones acts as source of radio-frequency radiations. Electromagnetic waves emitted from cell phones can damage the living cell. The purpose of this work was to study to identify the influencing effects of mobile phone radiations on early developmental stages of chick embryos. This study was an attempt to observe effects of high frequency radiations on protein, fats and lipids of developing chick embryo at 24 hrs, 36 hrs, 48 hrs, 72 hrs and 96 hrs. Incubator, fertilized eggs, and required chemicals were used for the experimental work. Biochemical estimation (protein and carbohydrates) was done in laboratory by using standard methods. It was found that, electromagnetic radiations emitted from mobile phones affects the development of various stages of chick embryo.

Keywords: Electromagnetic frequency (EMF), Egg incubator, Chick embryo, Biochemical estimation.

Article History

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I. INTRODUCTION

The invention of mobiles by Motorola in 1973 and its launch into market by 1984 has led to a revolution in communication world. Mobiles, commonly called as cell phones have acquired an important position in daily activities. It has conveniently replaced the landlines and become an important tool for communication among the people. It is an electronic device working in almost all the geographical areas. The mobiles are updated technologically ever single movement. The mobile is a source of radio frequency radiations. Phone emits non-ionizing low frequency electromagnetic wave for communication. This frequency causes health hazards. The use of data and internet causes emission of hazardous waves (Samkgne –Zeeb, F.Better, 2009).

The last twenty years has experienced the increase in non-ionizing radiations and such emissions of non-ionizing radiations has been alarming now a days. Hence the present study was designed to check the effect of cell phones frequency (EMF) radiations on developmental stages of chick embryos (Jyoti et.al., 2014).

The increasing scientific evidence of various health hazardous on exposure of Radio Frequency Radiations (RFR) emitted from both the cell phones and base stations have caused significant media attention and public discussion in recent years (J. Anbal Agan and Bhargavan Rajesh, 2017). One of the most important indicator of normal chick embryogenesis is hatchability, because of specific characters of chick embryo make popular model for studying the effect of environmental factor on living organism (Sechman A. Niedzolka, 2006).

Approximately 900-1800 MHz electromagnetic radiations cause certain types of cancer or other health problems; cell phones emit radio frequency radiations. The use of cell phone in early pregnancy and child language communication and motor skill leads to miscarriage (Geoffrey Lean, 2008).The mobile can cause certain damage on human being as well as developing chick embryo. Some researchers can study the effects of radiations on developing chick embryo on the biochemical point of view. The study was concerned to biochemical methods for estimating certain biomolecules. The researchers observed the variation or the amount of that molecules present in normal development and compare it with the developing chick embryo affected by radiations.

The effects of mobile radiations on developing chick embryo may decrease the level of protein, carbohydrate and fat content. The radiations may be responsible for decrease the level of these proteins, carbohydrate, and lipid. These experiments would investigate the effect of radiations on development of chick embryo. The world health

organization states mobile phone poses a potential health risk. Exposure can cause physiological change in a cell at molecular level it is reported to produce single and double stranded DNA break and inhibition of DNA synthesis and mitosis of lens epithelial cells (Lai .H and Singh N.P, 1996). Radiations can cause the several effects on cells at molecular level with respect to protein, carbohydrate, lipid contain .In in-vitro study, radio waves are responsible for different cellular adverse effects by inducing oxidative stress and stimulation of NADH oxidase enzyme (Suleyman Dasdag, Mehmet Zulkuf Akdag, 2006). In an early pregnancy the mother uses the mobile phones these radiations of phones are hazardous for the developing foetus (Papadopoulos et.al., 2017). Excess use of cell phone can affects the normal development of fetus or in some cases it miscarriages occurs. Mothers' cell phone use during pregnancy may cause behavioral problems in children. It would not be surprising that cell phone use by mothers can trigger inflammatory conditions leading to altered brain development in the fetus, which in turn might lead to behavioral disorders later in the child (GeoffreyLean, 2008) . A recent study indicates that the toxic effects of EMF on developing chick embryo brain cell organelles & membranes shows the adverse effect on blood brain barrier permeability, increased cellular apoptosis & torn blood vessels (Kalantari et.al., 2015).

Effect of Mobile Radiations on Human HealthIn males sperm quality, radio frequency electromagnetic radiations decrease sperm count and motility (System, 2012). The balance of experimental evidences does not support an impact of 'non-thermal' radio frequency fields" on the permeability of blood brain cancer. Glucose metabolismconsistent with the National Cancer Institute, two small studies exploring whether and how mobile radiation affects brain glucose metabolism showed inconsistent results.

II. MATERIALS AND METHODS:

For egg incubation, Lab incubator (Model no-CAT. NO.: BE/CI/MI-02) made up of specific heat resistant non-metallic material was used to avoid any internal reflection of cell phones radiations. Fertilized eggs were collected from Chaitanya Hatchery, Ahmednagar. Mobile phone, Glass mercury thermometer, chemicals as for estimation processing were made available in lab. The specifications of mobile phones used for study were indicated in Table:1.

The fertilize hen eggs were divided into two groups control and treated or experimental as suggested by Fatma Al-Qudsi and Solafa Azzouz, 2012. The eggs from both the groups were incubated at 37°C. The treated group was stressed by active mobile device (900-1800MHz) during incubation (Fig.1). The mobile ringed after one hour continuously for 15 minutes (Najam Siddiqi and Nasser Al Nazwani, 2019, Fatma Al-Qudsi and Solafa Azzouz, 2012). Embryos were extracted at its various developmental stage viz. 24 Hrs., 36 Hrs., 46 Hrs., 72 Hrs & 96

Hrs. A batch of 10 eggs was considered for control and experiment for each set. In experimental sets, mobile phone with above specification was kept in center of eggs. Control was run without it.

After specific developmental stage (in Hrs.), egg were taken out from incubator, dissected and embryos were obtained. Photography was done with the help of Canon EOS 70 D DSLR camera. The observations were compared with the control for biochemical estimation for its proteins and total carbohydrates and lipid contents.

Preparation of embryo extract/sample

The developing embryos of 24 Hrs., 36 Hrs., 46 Hrs., 72 Hrs., 96 Hrs. of weight 40gm, 50gm, 50gm. 60gm and 70gm respectively were taken from the eggs and homogenized in phosphate buffer with the help of glass mortar-pestle. It was then centrifuged at 3000 rpm. for 15 min. by using REMI automatic centrifuge. Supernatant was taken as a sample for each method. Triplet sets were used in this study. The Estimation of protein by Lowry's method (More et..al.., 2016) was used for total protein estimation. The estimation of total carbohydrate was performed by Anthrone method and DNSA.

III. RESULTS AND DISCUSSION:

The morphological observations showed improper development in 24 hrs chick embryo (Fig.2). In 36 hrs chick embryo, malformed somites were formed (Fig.3). In 46 hrs developing chick embryo, deformed eyes were developed (Fig.4). The 72 hrs chick embryo was with abnormal heart development (Fig.5). The 96 hrs developing chick embryo had abnormal eye development and angiogenesis (Fig.6). The recent study was an attempt to estimate biomolecules which are influenced by the effects of mobile phone radiations on early developmental stages of chick embryo.

The study indicated that EMF of mobiles (150 minutes in 10 hrs.) interferes in the development of chick embryo at various stages alternately forming a deformed embryo as well as may be a young one .This is a challenging field and lot more has to be done on this aspect with its histological and biochemical study. According to Cancer related research, there is no strong or consistent evidence that mobile phone use increases the risk of getting brain cancer or other head tumors.

The most observed and frequent results indicated mortality rate and rapid somite development in the developing chick embryos. The study revealed different developmental stages under frequency exposure (Ravinder Kumar Kohil and Jyoti, 2014). The wide spread use of mobile phones in the last decades has increased the concern about its potential effects on human body.

For 24, 36,46,72 and 96 hrs chick embryo development, carbohydrates and protein contents were compared between control and experimental sets (Table. 2). The 24 hrs. incubation showed that, the protein and

carbohydrate content is less in experimental set up than the contol one (Fig.7). For 36 hrs chick embryo, control is compared the protein and carbohydrate content with experimental (Fig.8) it shows decrease in concentrations than the control. For 46 hrs chick embryo, control is compared with the experimental (Fig.9) shows that proteins and carbohydrate content are decreases than the normal. The 72 hrs chick embryo, control is compared with the experimental (Fig.10) shows the decreasing concentrations of proteins and carbohaydrates. For 96 hrs chick embryo, as hrs are increases the protein and carbohydrate content in experimental (Fig.11) are decreases than normal.

IV. CONCLUSION:

The present study concludes that, the protein content in the experimental set of chick embryo is less than the normal or control set of chick embryo. The variation of protein amount occurs in each developmental stage of chick embryo .Carbohydrates content of experiment also found to be less when it compared with control. This can be useful for complete society. In the future it has wide scope that investigating possible effect on developing cancerous tissue. This study will also help people to definitely pay attention on electromagnetic radiations.

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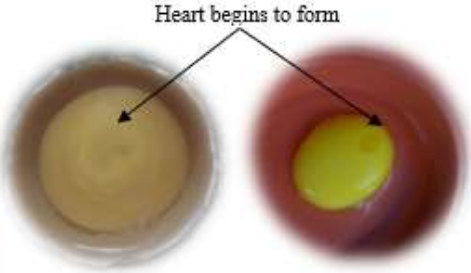
Table-1: Specifications of Mobile Phones used for Study.

Mobile no 1		**Mobile no 2**	
Resolution	720 pixels	Name	Gionee A1 lite packs
Touch screen display	5.00 inch	camera	13-megapixel
Processor	1.2 GHz cord core	SAR	0.796
RAM	2GB	Head	0.429

Table-2: - Biochemical estimation of carbohydrates and proteins at 24hrs,36hrs,46 hrs,72hrs and 96 hrs.

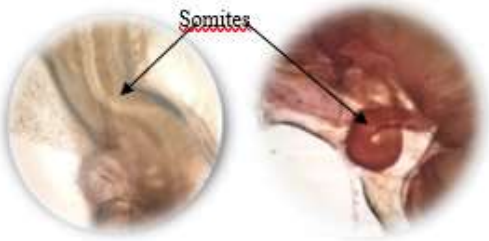
Sr. No.	**Duration of Incubation (Hrs.)**	**Estimation of reducing Sugar by DNSA (µg/ml)**		**Total Carbohydrate by Anthrone Method (µg/ml)**		**Estimation of Protein by Lowry's method (µg/ml)**	
		Control	**Experiment**	**Control**	**Experiment**	**Control**	**Experiment**
1	**24**	**68.80**	**56**	**72.3**	**65.4**	**26.00**	**21.00**
2	**36**	**97.60**	**68.80**	**78.2**	**70.47**	**28.00**	**24.00**
3	**46**	**112.1**	**84.80**	**89.6**	**72.5**	**30.1**	**23.7**
4	**72**	**113.2**	**96.70**	**92.8**	**73.00**	**33.00**	**26.25**
5	**96**	**115.3**	**96.55**	**101.5**	**77.00**	**37.8**	**30.00**

Fig.- 1: Incubation



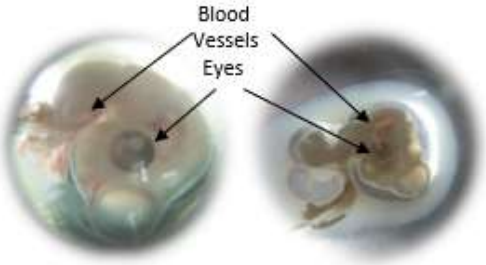
Control **Experimental**

Fig.- 2: Comparison of 24 hrs incubation.



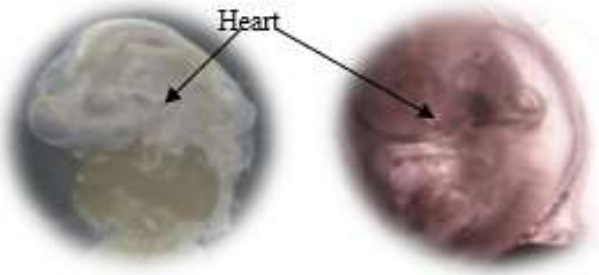
Control **Experimental**

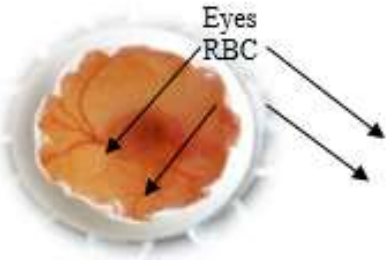
Fig.- 3: Comparison of 36 hrs incubation.



Control **Experimental**

Fig.- 4: Comparison of 46 hrs incubation.





Control **Experimental** **Control** **Experimental**

Fig.- 5: Comparison of 72 hrs incubation.

Fig.- 6: Comparison of 96 hrs incubation.

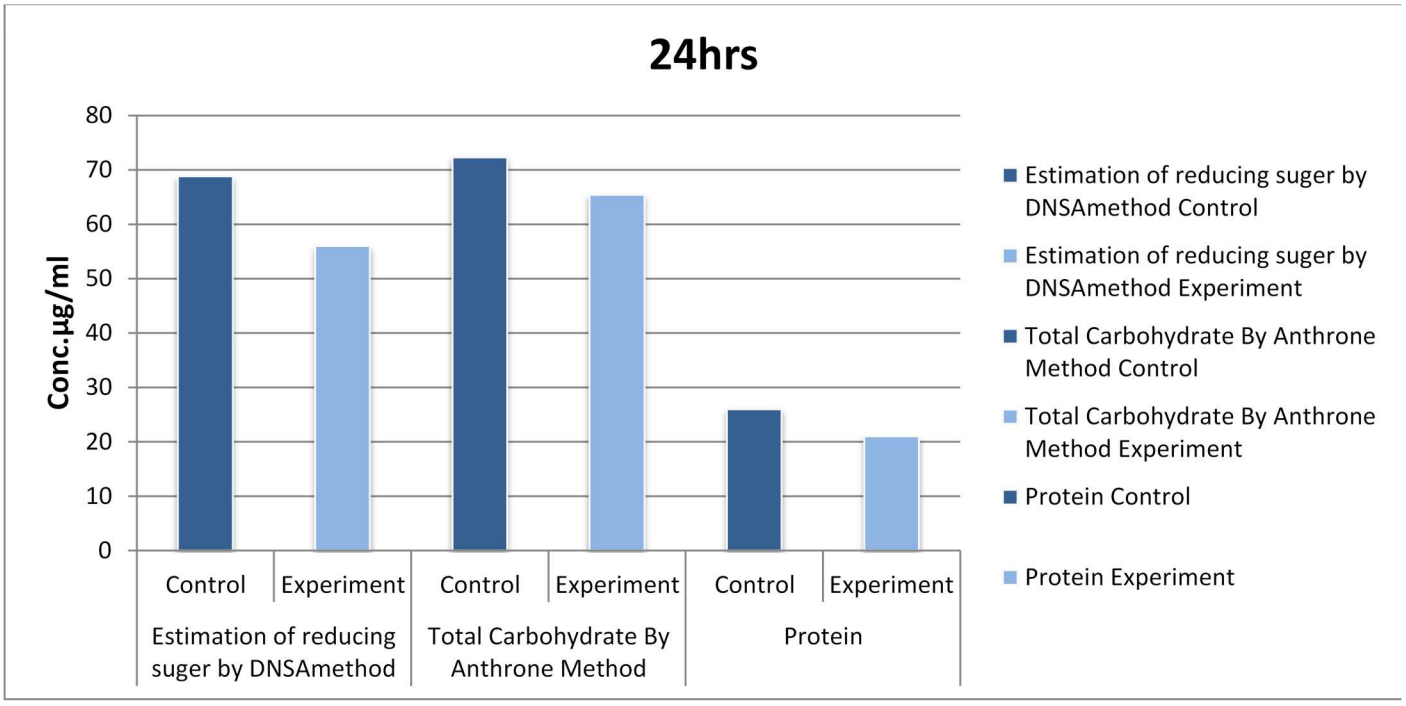


Fig.- 7: Comparison between carbohydrates and proteins for 24 Hrs. incubation.

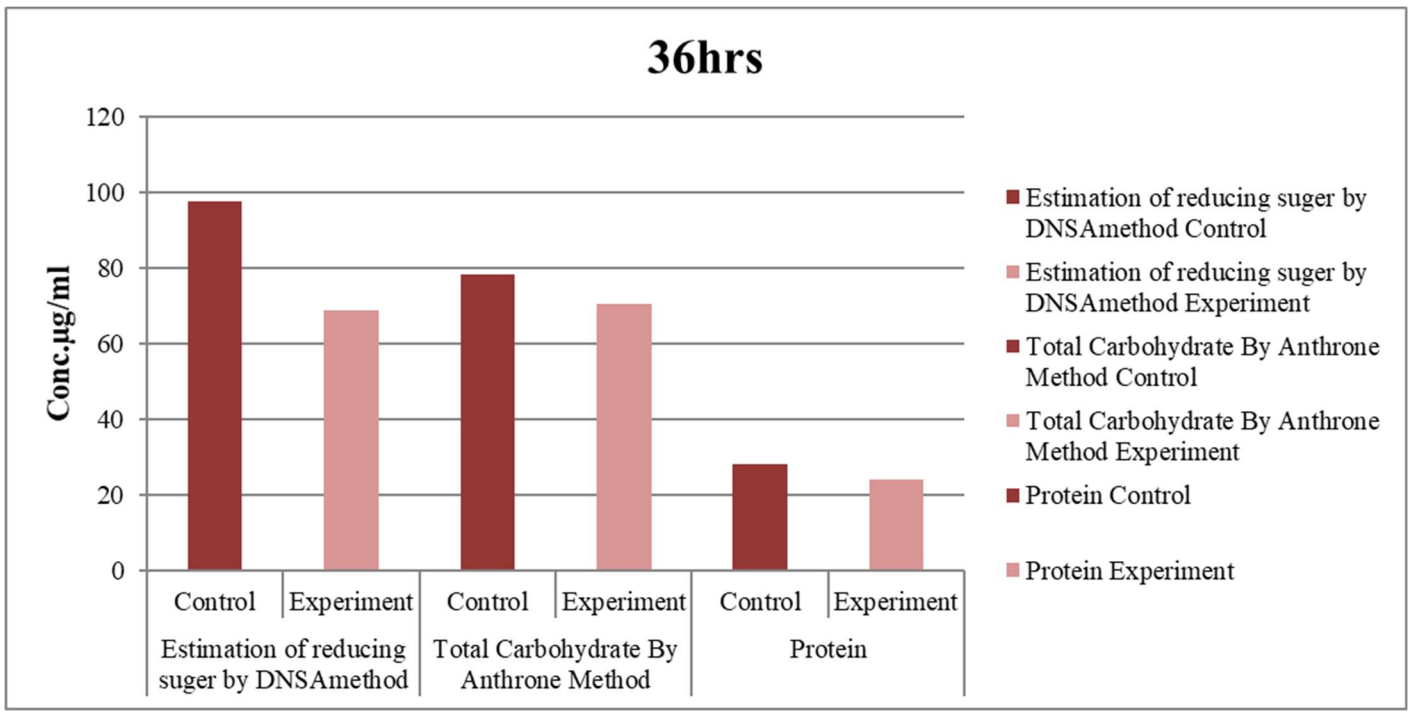


Fig.-8: Comparison between carbohydrates and proteins for 36 Hrs. incubation

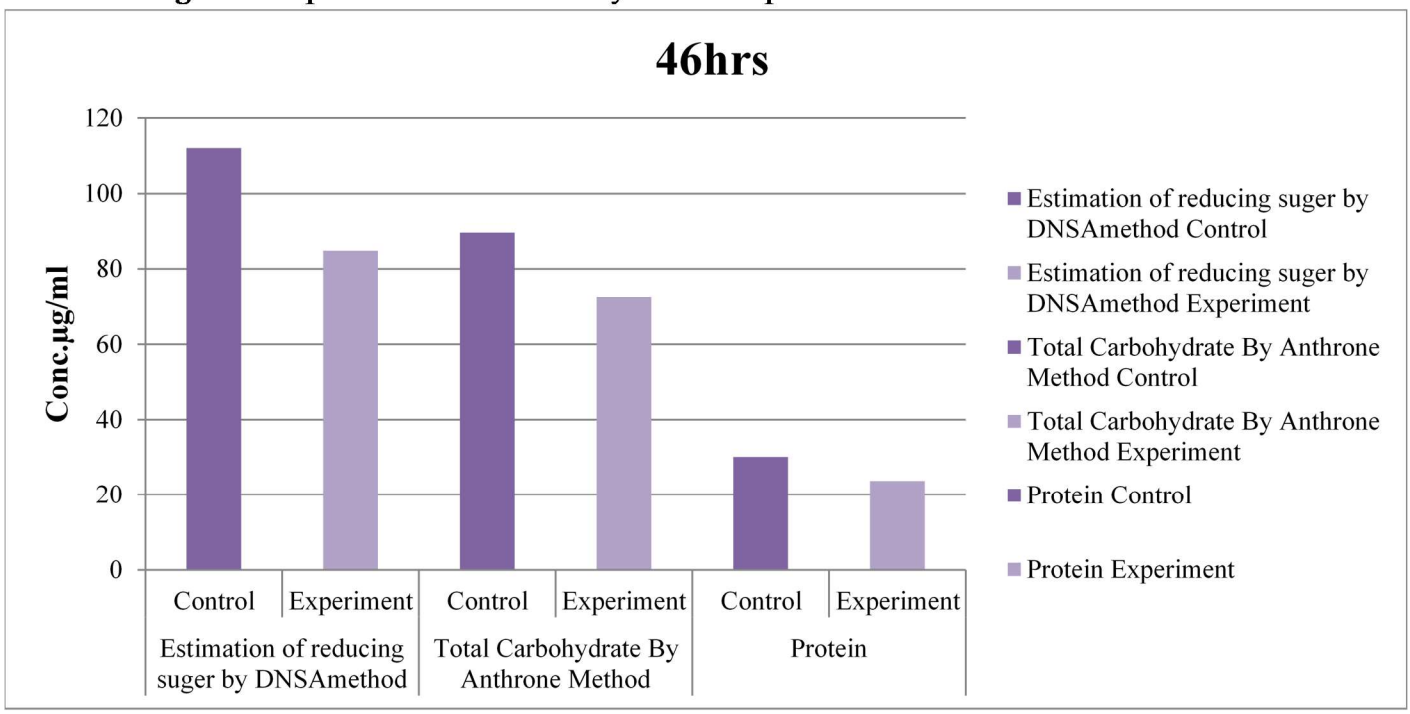


Fig.- 9: Comparison between carbohydrates and proteins for 46 Hrs. incubation.

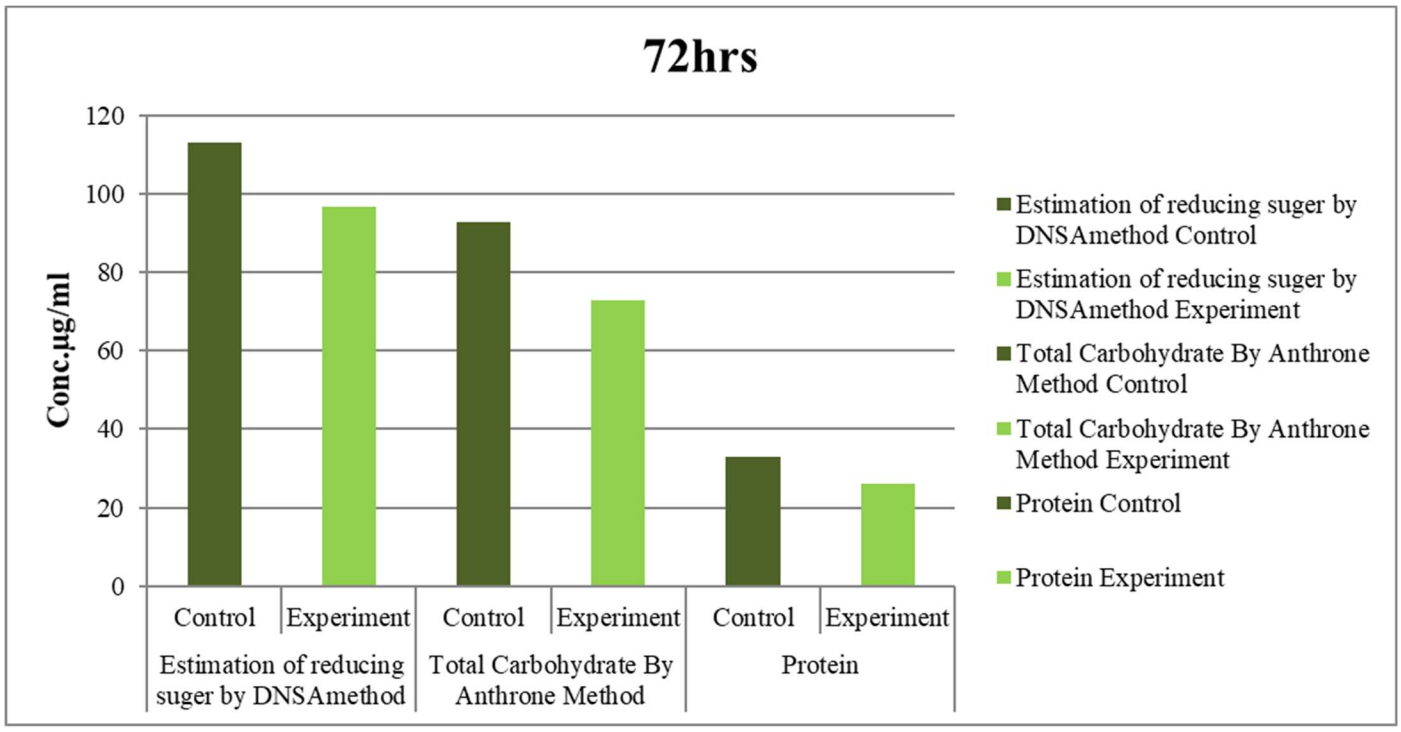


Fig.-10: Comparison between carbohydrates and proteins for 72 Hrs. incubation

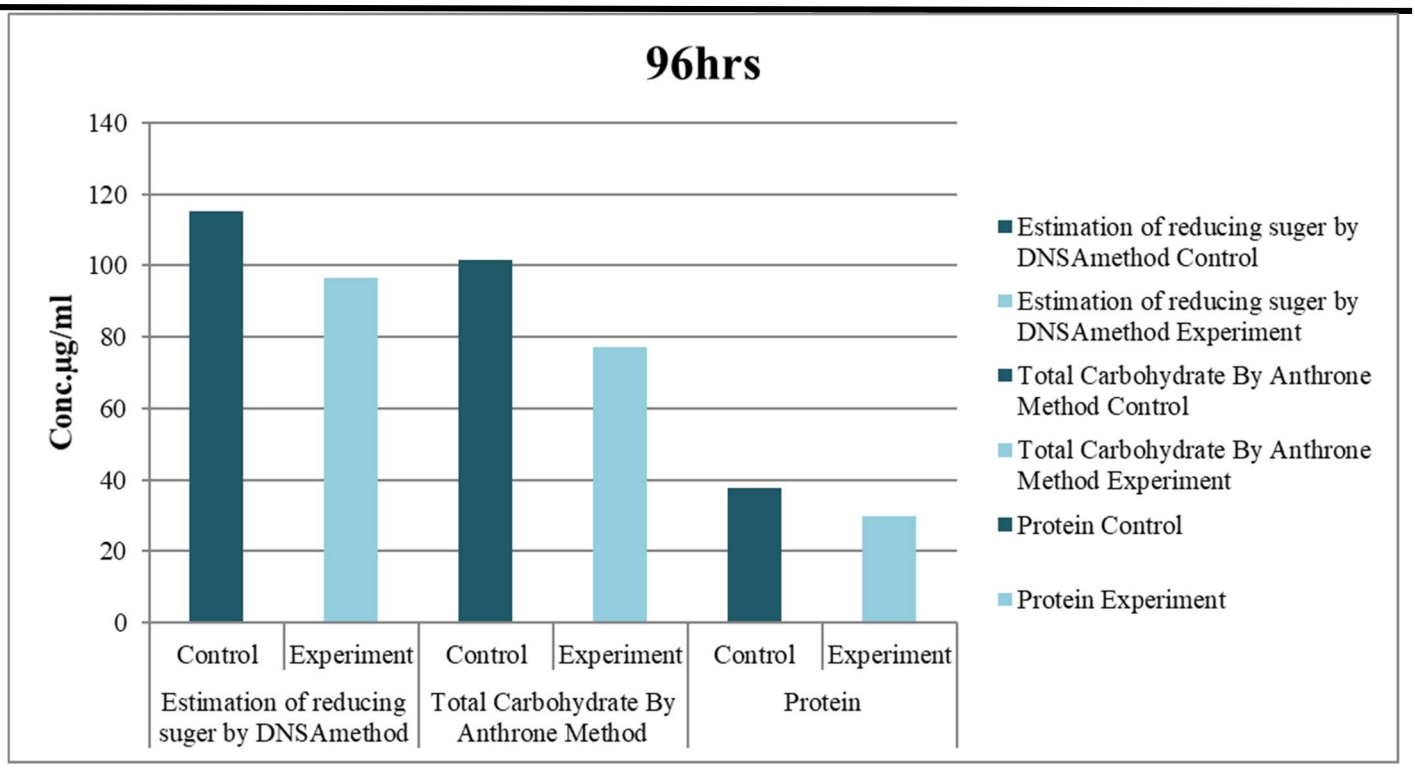


Fig.-11: Comparison between carbohydrates and proteins for 96 Hrs. incubation