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A new method of estimating the process spread using confidence interval of sample range

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ABSTRACT

This paper deals with a novel method of estimating the process spread (σ) in the construction of Shewhart control chart for means, basing on a new estimate derived from the confidence interval (CI) of sample range. The classical estimate ($\bar{R}/d_{2,n}$)of σ for a normally distributed data is utilized to arrive at anew estimate proposed as the weighted sum of the lower, middle and upper values of the 100(1-α) %CI for the process range basing on sample range. The weights are defined as inversely proportional to the absolute bias from the target spread. It is shown by simulation that the new estimate is more consistent than the classical point estimate based on $\bar{R}/d_{2,n}$. It is also shown that the $\bar{X}$ chart performs better in terms of β-risk when the new estimate is used.

1. Introduction

Consider a quality characteristic represented by the random variable X and let X ~ N (μ, σ^2). The classical Shewhart control chart is a process control tool used to detect the presence of assignable causes, if any, on the process. The $\bar{X}$ chart is used to control the process mean basing on subgroups of size n, drawn from the process periodically using m independent samples. When the process mean and standard deviation (SD) are known as μ_0 and σ_0 respectively, then we say that the process is under control, if $\bar{X}_i \in (\mathrm{UCL}, \mathrm{LCL})$ for i = 1,2, … m such that there is no recognizable pattern on the control chart, where LCL and UCL are the lower and upper control limits given as $\mu_0 \pm A\sigma_0$ and $A = \frac{3}{\sqrt{n}}$. The condition for the process to be in control is therefore given as

$$\bar{X}_i \in (\mu_0 - A\sigma_0, \mu_0 + A\sigma_0) \qquad \forall\, i = 1, 2 \ldots m \qquad (1)$$

In general, μ and σ are unknown and estimated from sample data after monitoring the process for a period of time. This helps in establishing LCL and UCL so that at any time point it is enough to verify whether (1) is satisfied or not. Details on the basics of control charts can be found in Douglas Montgomery [1] and a mathematical treatment in Mittag and Rinne [2].

One method of constructing the control limits is based on the point estimates of μ and σ. The control limits for the $\bar{x}$ chart however depend on estimate of process spread (σ). A point estimate of $\hat{\sigma}$ for normally distributed data is $\frac{\bar{R}}{d_{2,n}}$ where $\bar{R}$ is the mean of subgroup ranges and$d_{2,n}$ is a constant (correction factor to make the estimate unbiased). The values of $d_{2,n}$for different values of n are derived from the sampling distribution of R and available in statistical tables [2].

Even though a point estimate is a convenient way of describing the true (unknown) value of a parameter, it is a practice to provide 100(1-α)% Confidence Interval (CI) in which, the true range is expected to lie given by $\left[\frac{\bar{R}_L}{d_{2,n}}, \frac{\bar{R}_U}{d_{2,n}}\right]$. These two limits of CI serve as two potential candidates for $\hat{\sigma}$. Infact, any value in the CI is a likely candidate for the true range. By including the value at the middle of CI, we may perceive three different estimates of the range is given by the triplet $\tau = \left[\frac{\bar{R}_L}{d_{2,n}}, \frac{\bar{R}}{d_{2,n}}, \frac{\bar{R}_U}{d_{2,n}}\right]$, instead of an interval. Each of the elements of τ is a potential candidate to estimate σ.

2. Sample range and confidence intervals

Mittag and Rinne [2] has summarized different estimates of process spread basing on sample range as well as standard deviation. Other methods of estimating σ include Boyles and Burr [3]. For the i^{th} sample,

Let R_i= **(**Max – Min)$_i$ for i = 1, 2, …, m. If ρ denotes the range for the entire process, then R_i is an estimate of ρ. It can be shown that R_i based on a subgroup size n has the property

$$\mathrm{E}\left(\frac{R_i}{d_{2,n}}\right) = \sigma_0 \; and \; \mathrm{V}\left(\frac{R_i}{d_{2,n}}\right) = \left[\frac{e_n}{d_{2,n}}\right]^2 \left[\frac{R_i}{d_{2,n}}\right]^2 \qquad (2)$$

Therefore $\widehat{\sigma_0} = \frac{R_i}{d_{2,n}}$ is an unbiased estimate of σ with a SD of $\frac{e_n R_i}{d_{2,n}^2}$. The constants $d_{2,n}$ and e_n are compiled and available in statistical tables [2]. Since R_i is only a point estimate of ρ it is possible to construct 100(1-α)% CI for ρ as $\frac{R_i}{d_{2,n}} \pm g\sqrt{\mathrm{V}\left(\frac{R_i}{d_{2,n}}\right)}$ where g is a constant which is a function of n and α.Using (2) these limits reduce to$\left[\frac{R_i}{d_{2,n}} \pm g\left(\frac{e_n R_i}{d_{2,n}^2}\right)\right]$. Since the limits are not symmetric, define constants $g_1 \geq 0$ and $g_2 \geq 0$ such that the CI will be

$$\left[\frac{R_i}{d_{2,n}} - g\left(\frac{e_n R_i}{d_{2,n}^2}\right),\ \frac{R_i}{d_{2,n}} + g\left(\frac{e_n R_i}{d_{2,n}^2}\right)\right] \quad (3)$$

Rearrangement of the terms in (3) leads to the lower and upper confidence limits as

$$L = \frac{R_i}{d_{2,n}} G_1 \text{ and } U = \frac{R_i}{d_{2,n}} G_2$$

where $G_1 = \left[1 - g\left(\frac{e_n}{d_{2,n}}\right)\right]$ and $G_2 = \left[1 + g\left(\frac{e_n}{d_{2,n}}\right)\right]$ (4)

This leads to the triplet $\tau = [\theta_1, \theta_2, \theta_3]$ where

$$\theta_1 = \frac{R_i}{d_{2,n}} G_1,\ \theta_2 = \frac{R_i}{d_{2,n}} \text{ and } \theta_3 = \frac{R_i}{d_{2,n}} G_2 \quad (5)$$

In the following section, we develop a new estimate of σ using the triplet elements and study the properties of the new estimate.

3. Values of G_1 and G_2

One way of constructing the CI is based on the percentiles of the standardized sample range from normal population. Let r_n denote a sample range with sub group size. Given $0 \le \alpha \le 1$, the upper confidence limit is based on the cumulative distribution function of R_n for which

$$F(r_{n,1-\alpha}) = P(R_n \le r_{n,1-\alpha}) = 1 - \alpha \quad (6)$$

where $r_{n,1-\alpha}$ is the percentile on the sampling distribution of R_n corresponding to (1-α). Similarly, the lower confidence limit satisfies the percentile

$$F(r_{n,\alpha}) = P(R_n \le r_{n,\alpha}) = \alpha \quad (7)$$

The values of $r_{n,\alpha}$ for different n and α are given in [2].For instance, with α = 0.05, we get $r_{n,\alpha}$ = 4.47 for n = 10. Similarly, with α = 0.05 the lower percentile for n = 10 will be 1.86. For some selected values of n, the coefficients are shown in Table1.

Table 1
Coefficients for the standardized sample range.

N	$d_{2,n}$	e_n	$r_{n,0.05}$	$r_{n,0.95}$
10	3.078	0.797	1.86	4.47
15	3.472	0.755	2.32	4.80
20	3.735	0.729	2.63	5.01

For n = 10 we get e_n = 0.797, d_n = 3.078, G_1 = 0.51838 and G_2 = 2. 15744.So, the 95% confidence limits for the true range of the process will be 1.86 to 4.47.

In the following section we propose a new estimator of σ using the triplet given in (5).

4. The new estimator of σusing CI of r_n

We propose a linear combination of these three values given in (5) as a new estimator of σ is given by

$$\hat{\sigma}_{R,CI} = \ell_1\theta_1 + \ell_2\theta_2 + \ell_3\theta_3 \quad (8)$$

such that $\ell_i \ge 0$ for i = 1,2,3. and $\sum_{i=1}^{3} \ell_i$

Suppose the process is designed in such a way that it should have a target spread σ′. This can be known from historical data on the process or from the engineering specifications. There are different ways of proposing the weights ℓ_1, ℓ_2, ℓ_3. One way is an *ad hoc* method proposed by Vishnu Vardhan and Sharma [4], according to which $\ell_2 = 0.5$ and $\ell_1 = \ell_3 = 0.25$. Hence the weights can be taken as

$$w_i = |\theta_i - \sigma'|^{-1} \quad (9)$$

such that $\ell_i = \frac{w_i}{\sum_{i=1}^{3} w_i}$ for i = 1,2,3. (10)

As a result, the new estimator given in (8) becomes a convex combination of the middle and extreme values of the confidence interval. It can be seen that the weights decrease as the absolute error increases.

Sai Sarada *et.al* [5] have used a method in which the weights are inversely proportional to absolute difference between θ_i and σ' ∀ i = 1,2,3. Reddi Rani *et.al* [6] have used the CI based estimate of process mean and proposed a new method of evaluating the OC curve of a single sampling plan by variable type of inspection.

In essence we propose that the CI based estimator of σ contains information on the probable variation in the parameter and hence we claim that this estimator will be more useful than the point estimator obtained at the middle of the CI.
In the following section a stepwise procedure is discussed followed by simulated experiments in support of the new estimate**.**

5. Step wise procedure

The following steps can be followed to implement the new method.

- Generate 'm' random samples each of size 'n' from N (μ, σ^2).
- Evaluate the sample mean and range for each subgroup.
- Calculate the CI using (3)
- Read e_n and d_n, from tables and calculates G_1, G_2 using (4)
- Calculate θ_1, θ_2 and θ_3 of each subgroup, using (5)

- Calculate w_1, w_2, w_3using (9)
- Calculate ℓ_1, ℓ_2, ℓ_3 using (10)
- Find new estimator$\hat{\sigma}_{R,CI}$ using (8)

This procedure leads to $\hat{\sigma}_{R,CI}$ for each of the m samples and this data can be used to study the empirical properties of the new estimate.

For each value of n, the new estimate can be found either on real data or on a simulated dataset. Repeating this exercise over 'm' samples like m = 500 or 1000, it is possible to study the statistical properties of $\theta_1, \theta_2, \theta_3$ and new estimate $\hat{\sigma}_{R,CI}$. Since θ_2 is an estimate mostly followed in practice, the simulated expected value, bias and standard error of the new estimate can be compared with those of θ_2.

In the following section a simulated experiment is reported to demonstrate the working of the new method.

6. Illustration by simulation

Let us take X~N (10.5, 2.25) so that the process has σ = 1.5 and the data be expressed in consistent units. We have generated 500 samples each of size n = 10,15 and 20 from the above distribution using the Random Number Generation tool of the Data Analysis Pak in MS-Excel.

Taking n = 10, we get e_n = 0.797, d_n = 3.078, G_1= 0.51838, G_2 = 2.15744. The confidence interval for each sample is found using an MS-Excel template developed for this purpose. The summary of results is shown in Table2.

Table 2
Estimate of σ using sample Ranges under the two methods.

n	M	Estimate ± S. E	
		Classical Point Estimate	New Estimate
10	500	1.4572 ± 0.0161	1.4767 ± 0.0070
15	500	1.3103 ± 0.0151	1.4185 ± 0.0065
20	500	1.2472 ± 0.1490	1.3909 ± 0.0076

From Table 2. It can be seen that irrespective of subgroup size n, the new estimate using confidence intervals of R is found to be closer to the hypothetical process spread of σ = 1.5. Further the standard error is much lower than that of classical estimate. Hence, we propose that the new estimate of σ basing on the CI of sample ranges provides a consistent estimate with less bias when compared to $\frac{\bar{R}}{d_{2,n}}$.

In the following section we study the impact of the new estimate on the Operating Characteristic (OC) of the $\bar{x}$ Chart.

7. Effect of new estimate on the OC function of the $\bar{x}$ chart

The performance of the $\bar{X}$ chart depends on the control limits which are based on the estimate of σ. One of the performance measures of the chart is the Operating Characteristic (OC), which measures the type-2 risk (β). The probability of accepting the process when there is a true shift in the mean is given by the OC function. It can be shown that the OC is a function of the magnitude of shift in the mean given by $k = \frac{(\mu_1 - \mu_0)}{\sigma}$ where μ_0 is the current mean and μ_1 is the shifted mean, so that $\mu_1 = \mu_0 + k\sigma$.

In a practical situation when the suspected shift in mean isμ_1 we can determine k if σ is known. Following Montgomery and Runger [7], the OC function can be calculated in terms of n and k as

$$\beta = \Phi(3 - k\sqrt{n}) - \Phi(-3 - k\sqrt{n}) \qquad (11)$$

where Φ denotes the cumulative standard normal distribution.

Since n is fixed in this study, the pattern of the OC Curve depends on k only, which also depends on σ. We consider two estimates of σ given by a) Classical estimate $\frac{\bar{R}}{d_{2,n}}$ and b) New estimate $\hat{\sigma}_{R,CI}$ given in (8) and compare the OC values with the true OC obtainable when σ is known.

For different values of shifted mean, we have calculated k along with the OC values of $\bar{x}$ Chart.

Suppose the true σ specified by the hypothesis is used instead of the estimated value. Then the resulting k and β will be the true values with which the estimated values will be compared. The results are shown in Table 3.

Table 3
Comparison of OC values under different estimates of σ

μ_1	Classical estimate		New estimate		True value	
	K_{cla}	β_{cla}	k_{new}	β_{new}	k_{true}	β_{true}
10.5	0.00000	0.99730	0.00000	0.99730	0.00000	0.99865
11.0	0.44190	0.94548	0.37446	0.96529	0.33333	0.97417
11.5	0.88381	0.58128	0.74891	0.73622	0.66667	0.81375
12.0	1.32571	0.11658	1.12337	0.29033	1.00000	0.43554
12.5	1.76761	0.00480	1.49783	0.04123	1.33333	0.11192
13.0	2.20951	0.00003	1.87229	0.00175	1.66667	0.01159

It follows from Table3 that the true OC value, which is expected by the hypothesis is *under estimated* by both the methods. For instance, when μ_1=11.0, the true OC is β = 0.9741 which means 97.4% of the time the process fails to detect the shift. When $\frac{\bar{R}}{d_{2,n}}$ is used we getβ = 0.9454 only.

The new estimator however is β_{new} = 0.9652, which is higher than β_{cla} with classical method.

The OC curves are drawn with n = 10, 15 and 20 as shown in Fig. 1.

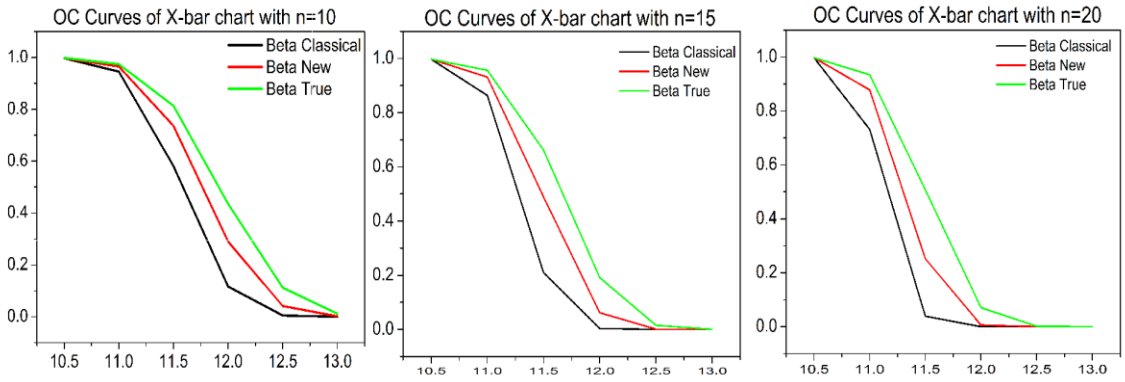

Figure1. OC Curves of X-bar Chart with different methods of estimating σ

From Fig.1, It follows that as n increases the OC curve becomes steeper, which is an expected result. In each case the OC curve based on the new estimate of σ is closer to the true OC curve, when compared to the curve based on the classical point estimate $\frac{\bar{R}}{d_{2,n}}$.

8. Conclusions

In this paper we have proposed a new method of estimating σ of a normally distributed process using sample range. We have drifted from a point estimate to an interval estimate of σ and combined the lower, middle and upper values of the CI through a convex combination. The weights are allowed to vary inversely with the distance of each value from the hypothetical σ. It is shown by simulated experiments that the new estimate performs better in terms of standard error and provides better OC curve.

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Evaluation of enzymes in laundry detergents as effective stain removers

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ABSTRACT
Enzymes are the most important functional components of detergents contributing to development and improvement of commercial detergents. Laundry detergents principally comprise of four major classes of enzymes, viz., proteases, lipases, amylases, and cellulases. Each enzyme catalyses specific reactions on the stains, thereby enhancing washing performance and efficacy of the detergent. The present research work is a laboratory exercise to explore the stain removing capacity and cleaning efficiency of locally available laundry detergents. This discussion aims at comparing different brands of detergents, containing various enzymes with known composition with those which do not contain enzymes having unknown composition.

INDEX TERMS- Detergents, enzymes, stains, known composition, unknown composition, stain removing capacity

I.INTRODUCTION

Over the past four decades, enzymes have played an important role in the development and advancement of an array of detergent products. Before the advent of modern detergent formulations, soap and sodium carbonate were the major detergent ingredients, and the cleaning action in laundering could be credited to only the mechanical action [1]. In this direction, presently, enzymes have become the integral functional components in detergents contributing to efficient, mild eco friendly cleaning of laundry. Enzymes as are derived from renewable sources, prove to be environmentally safe and have garnered adequate attention in detergent industry [2].

Laundry stains and dirt come in various forms including proteins, starches and lipids. The deliberate use of detergents in water at high temperatures along with vigorous mixing, removes most type of stains and dirt but leads to shortening of clothing life and other materials. Introduction of detergents with enzyme formulations have been a major breakthrough in detergent research and development [3]. Use of enzymes allows lower temperatures to be employed with shorter periods of agitation with only a preliminary period of soaking. Generally, enzyme detergents remove protein from clothes soiled with blood, milk, sweat, etc. far more effectively than non-enzyme detergents [4]. Among the enzymes, proteases have dominated the detergent market, whereas, there has been enhancement in employing amylases and lipases for the removal of starchy and fatty stains [5,6]. There has been a recent entry of cellulases, in the detergent market, and it's mode of action is to directly act on the fabric rather than to degrade particular stains. Various patents too have been filed for various enzymes in detergents [7].

Enzymes have been used in surprisingly small amounts in most detergents encapsulated in dust-free granulates [8]. Once released from its granulated form, the enzyme must withstand pH values between 8.0 and 10.5 and must retain activity upto 60˚C. Microbial sources have contributed significantly to cheaper enzyme production. Several species of *Bacillus* effectively produce these enzymes, including proteases like Alcalase, from *B. licheniformis*, Esperase, from an alkalophilic strain of a *B. licheniformis* and Savinase, from an alkalophilic strain of *B. amyloliquefaciens*. *B. licheniformis* supply Maxatase, which works between 10-65˚C and pH 7-10.5 [9,10]. Savinase and Esperase are active up to pH 11 and 12, respectively. Suitable enzyme formulations are been marketed by detergent manufacturers in powder as well as liquid forms for domestic use.In developed countries, the use of enzymes based detergent formulations has become very common [11]. Although, detergent industry is the largest industry with 25-30% of total sales, research targeting the comparative analysis and efficacy of various detergent brands has rarely been published.

With this background we have formulated our present research work to conduct a comparative study of different brands of detergents, containing various enzymes with those which do not contain enzymes.

II. MATERIALS AND METHODS

1. Detergents- The following detergents were used in order to identify their mode of action.
They were further classified into two groups based upon their composition.
(A). Detergents that contain enzymes (Brands)
1. A1; 2. A2; 3. A3; 4. A4; 5. A5
(B). Detergents with unknown composition (Brands)
1. B1; 2. B2; 3. B3; 4. B4; 5. B5

2. STAINS
The stains employed while performing the experiment were-

1. Pomegranate- The seeds of the fruit were taken and smashed on the cloth pieces to form the stain.
2. Pickle- A homemade pickle was taken and applied to the cloth pieces.
3. Ink- A standard quality ink was applied on to the cloth pieces and were dried.
4. Peanut butter- A readymade peanut butter available in the market was applied on to the cloth pieces.

5. Vermillion (kumkum)-A packet of vermilion was mixed with some water to form a paste and was applied to the cloth pieces.
6. Nail polish- A yellow color (any color of choice) nail polish was applied to the cloth pieces.
7. Black dye- A black dye available in the market was mixed with water and the paste was applied to the cloth pieces.
8. Egg yolk- Egg yolk from some eggs was collected and was applied on to the cloth pieces.
9. Soy sauce- The soy sauce available in the market was applied to the cloth pieces.
10. Grease- Grease was applied to the cloth pieces and dried. All the stained cloth pieces were dried completely before washing

3.CLOTH

The protocols followed for evaluating detergent performance were according to the methodology followed by [12,13]. A regular cloth piece (white) was taken and cut into uniform size (10cm x 10cm). A circle was drawn with a marker in order to differentiate the stained portion from the unstained portion. Various stains were applied on the cloth pieces in triplicates (Fig. 1). Stain removing capacity of different detergents was achieved by comparing the two categories of enzymes *viz*., (A) Detergents with enzymes and (B) Detergents with unknown composition. A total of 10 different controls were prepared by applying the stain on measured size of cloth. Beakers (200 ml) were taken and filled with 100mL of water. To each beaker 1 spatula of detergent (weighing, 1.20g approximately) was added and mixed thoroughly. The dried stained cloth pieces were soaked in the beakers for about 10 minutes (Fig. 2). After 10 minutes, the cloth pieces were handwashed, dried and preserved for observation (Fig. 3, 4)

III. RESULTS AND DISCUSSION

As depicted in Fig 5 and tables- 1.1, 1.2, 1.3, 1.4 and 1.5; the following observations were recorded for the detergents containing enzymes, indicating their stain removal efficiency-A1 detergent, exhibited 100% efficiency by removing 5 different stains, 95% of two stains, 90% of two different stains and least efficiency towards one stain. A2 detergent showed 100% efficiency by removing four different stains, 95% of two stains, 90%, 80%, 70%,50%, of other stains. A3 detergent was able to remove 100% egg yolk stain, 95%, 90% each of one stain respectively,80% of five stains, 75% of nail polish stain and 50% of Black dye stain. A4 detergent could remove two stains 100% efficiently, 95% of soy sauce, 90% of four different stains, 85%, 60%, 50% one of each stain respectively.A5 detergent could remove five different stains 100% efficiently, 95% of one stain,90%, 85%, 80% of each one stain respectively.

With regards to detergents with unknown composition, as shown in Fig 6 and tables- 2.1, 2.2, 2.3, 2.4 and 2.5, the following observations were recorded indicating their stain removal capacity- B1 detergent could effectively remove six different stains with 100% efficiency, one stain 90% efficiently, 80% of two stains, one stain upto 60%. B2 detergent could remove 100% efficiently three different stains, 95% , 90% of each two stains, 75%, 70%, 60% of each one stain respectively. B3 detergent could remove two different stains with 100% efficiency, 90% of two stains, 80% and 50% of three stains each respectively. B4 detergent could remove two stains 100%, 70%, 60% efficiently 95%, 90% , 75%, 50% of each one stain. B5 detergent could remove three stains 100% effectively, 95%, 85%, 80%, 70%, 50% of one each stain respectively and 60% of two stains.

Thus, A1 detergent was more effective than the other detergents with enzymes. It could remove most of the tough stains like nail polish, dye, ink, and pomegranate with 100% efficiency which other detergents could not remove. Whereas, among the detergents of unknown composition, B1 was found to be effective as it could remove most of the stains like pomegranate, peanut butter, Vermillion (kumkum), egg yolk, soya sauce and grease 100% effectively.

Experiments with locally available detergents targeting their stability and compatibility with various enzymes have been conducted by several researchers [9,10, 11, 12, 13]. Our results were in complete agreement with observations of other researchers.

Future prospects

Although, enzymes in detergents have provided new developments in detergent industries. Still, there is a requirement for environmentally safe laundry detergents with smaller quantities of organic and inorganic chemical ingredients. In addition to this core research into detergents with lesser requirement of water, energy and maximal washing performance at lower temperatures would lead to development of effective, laundry detergents. We need to explore eco-friendly alternatives which can be employed in cleaning the laundry efficiently without the use of hazardous and toxic chemicals.

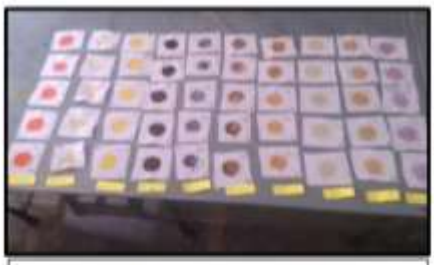

Fig. 1. Application of various stains -:1- Pomegranate juice, 2-Pickle, 3-Ink, 4-Peanut, 5-Vermilion. 6-Nail polish,7- Black dye, 8-egg yolk, 9-Soy sauce, 10-Grease

Fig. 2.Stained cloths soaked in different detergents.

Fig. 3.Stained cloths, treated with detergents having known composition,containing enzymes, dried and segregated.

Fig. 4. Stained cloths, treated with detergents having unknown composition, dried and segregated.

Table 1.1 STAIN REMOVING CAPACITY OF A1 DETERGENT

	% of stain removed	Stain applied
A1 DETERGENT	100%	Pomegranate, peanut butter, Vermillion, egg yolk, soy sauce
	95%	Pickle, Grease
	90%	Nail polish, Black dye
	70%	Ink

Table 1.2 STAIN REMOVING CAPACITY OF A2 DETERGENT

	% of stain removed	Stain applied
A2 DETERGENT	100%	Pomegranate, egg yolk, soy sauce, Grease
	95%	Peanut butter, vermillion
	90%	Nail polish
	80%	Black dye
	70%	Pickle
	50%	Ink

Table 1.3 STAIN REMOVING CAPACITY OF A3DETERGENT

	% of stain removed	Stain applied
A3 DETERGENT	100%	Egg yolk
	95%	Soy sauce
	90%	Peanut butter
	80%	Pomegranate, pickle, Ink, vermilion, Grease
	75%	Nail polish
	50%	Black dye

Table 1.4 STAIN REMOVING CAPACITY OF A4 DETERGENT

	% of stain removed	Stain applied
A4 DETERGENT	100%	Peanut butter, egg yolk
	95%	Soy sauce
	90%	Pomegranate, pickle, ink, vermilion
	85% 60% 50%	Grease Black dye Nail polish

Table1.5 STAIN REMOVING CAPACITY OF A5 DETERGENT

	% of stain removed	Stain applied
A5 DETERGENT	100%	Pickle, peanut butter, egg yolk, soy sauce
	95% 90%	Vermilion ,pomegranate Grease
	85% 80% 60%	Black dye Nail polish Ink

Table 2.1 STAIN REMOVING CAPACITY OF B1 DETERGENT

	% of stain removed	Stain applied
B1 DETERGENT	100%	Pomegranate, peanut butter, vermilion , egg yolk, soy sauce, grease
	90%	Pickle
	80% 60%	Nail polish, black dye Ink

Table 2.2 STAIN REMOVING CAPACITY OF B2 DETERGENT

	% of stain removed	Stain applied
B2 DETERGENT	100%	Peanut butter, egg yolk, soy sauce
	95%	Grease, pomegranate
	90%	Pickle, vermilion
	75% 70% 60%	Nail polish Black dye Ink

Table 2.3 STAIN REMOVING CAPACITY OF B3 DETERGENT

	% of stain removed	Stain applied
B3 DETERGENT	100%	Egg yolk, soy sauce
	90%	Peanut butter, grease
	80%	Pomegranate, pickle, vermilion
	50%	Ink, nail polish, black dye

Table 2.4 STAIN REMOVING CAPACITY OF B4 DETERGENT

	% of stain removed	Stain applied
B4 DETERGENT	100%	Egg yolk, soy sauce
	95% 90%	Peanut butter Grease
	75% 70%	Vermilion Pomegranate, pickle
	60%	Nail polish, black dye
	50%	Ink

Table 2.5 STAIN REMOVING CAPACITY OF B5 DETERGEN

	% of stain removed	Stain applied
B5 DETERGENT	100%	Egg yolk, soy sauce, grease
	95%	Peanut butter
	85% 80% 70% 60%	Pickle Pomegranate Nail polish Vermilion, Black dye
	50%	Ink

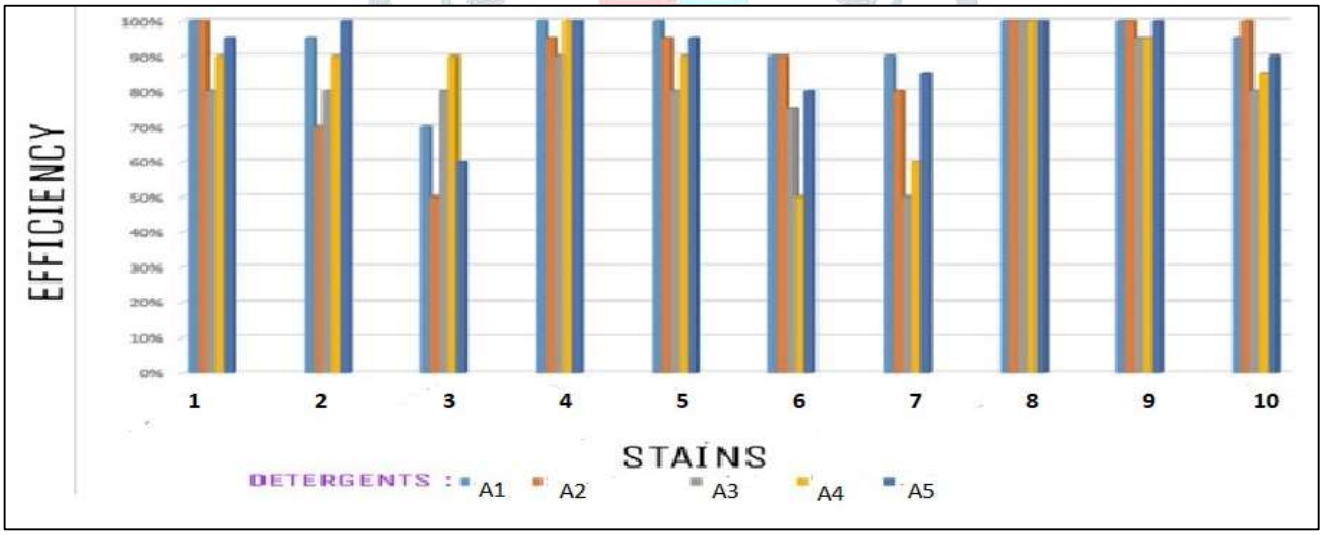

Fig. 5 STAIN REMOVING CAPACITY OF DETERGENTS WITH ENZYMES

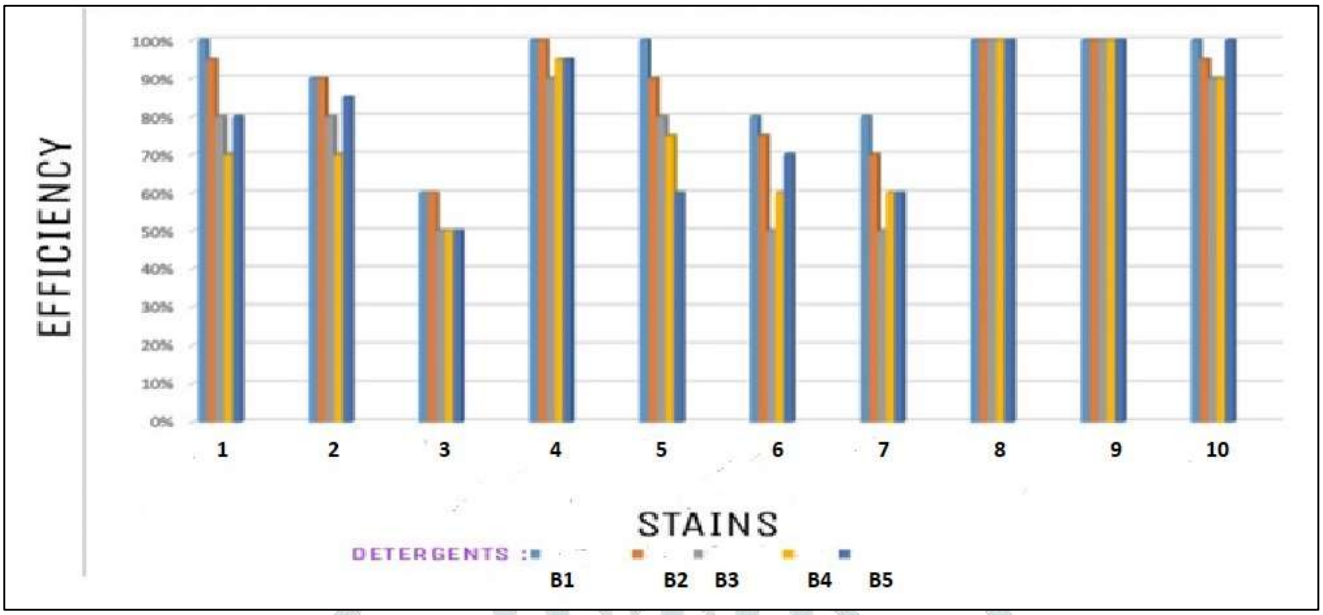

Fig. 6 STAIN REMOVING CAPACITY OF DETERGENTS WITH ENZYMES

Stains -:1-Pomegranate juice, 2-Pickle, 3-Ink, 4-Peanut, 5-Vermilion. 6-Nail polish, 7- Black dye, 8-Egg yolk, 9-Soy sauce, 10-Grease

IV. ACKNOWLEDGEMENT

The authors are thankful to Principal Sister Amrutha, St. Ann's College for women, for providing the necessary laboratory facility and for financial assistance.

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Evaluation of enzymes in laundry detergents as effective stain removers

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ABSTRACT
Enzymes are the most important functional components of detergents contributing to development and improvement of commercial detergents. Laundry detergents principally comprise of four major classes of enzymes, viz., proteases, lipases, amylases, and cellulases. Each enzyme catalyses specific reactions on the stains, thereby enhancing washing performance and efficacy of the detergent. The present research work is a laboratory exercise to explore the stain removing capacity and cleaning efficiency of locally available laundry detergents. This discussion aims at comparing different brands of detergents, containing various enzymes with known composition with those which do not contain enzymes having unknown composition.

INDEX TERMS- Detergents, enzymes, stains, known composition, unknown composition, stain removing capacity

I.INTRODUCTION

Over the past four decades, enzymes have played an important role in the development and advancement of an array of detergent products. Before the advent of modern detergent formulations, soap and sodium carbonate were the major detergent ingredients, and the cleaning action in laundering could be credited to only the mechanical action [1]. In this direction, presently, enzymes have become the integral functional components in detergents contributing to efficient, mild eco friendly cleaning of laundry. Enzymes as are derived from renewable sources, prove to be environmentally safe and have garnered adequate attention in detergent industry [2].

Laundry stains and dirt come in various forms including proteins, starches and lipids. The deliberate use of detergents in water at high temperatures along with vigorous mixing, removes most type of stains and dirt but leads to shortening of clothing life and other materials. Introduction of detergents with enzyme formulations have been a major breakthrough in detergent research and development [3]. Use of enzymes allows lower temperatures to be employed with shorter periods of agitation with only a preliminary period of soaking. Generally, enzyme detergents remove protein from clothes soiled with blood, milk, sweat, etc. far more effectively than non-enzyme detergents [4]. Among the enzymes, proteases have dominated the detergent market, whereas, there has been enhancement in employing amylases and lipases for the removal of starchy and fatty stains [5,6]. There has been a recent entry of cellulases, in the detergent market, and it's mode of action is to directly act on the fabric rather than to degrade particular stains. Various patents too have been filed for various enzymes in detergents [7].

Enzymes have been used in surprisingly small amounts in most detergents encapsulated in dust-free granulates [8]. Once released from its granulated form, the enzyme must withstand pH values between 8.0 and 10.5 and must retain activity upto 60˚C. Microbial sources have contributed significantly to cheaper enzyme production. Several species of *Bacillus* effectively produce these enzymes, including proteases like Alcalase, from *B. licheniformis*, Esperase, from an alkalophilic strain of a *B. licheniformis* and Savinase, from an alkalophilic strain of *B. amyloliquefaciens*. *B. licheniformis* supply Maxatase, which works between 10-65˚C and pH 7-10.5 [9,10]. Savinase and Esperase are active up to pH 11 and 12, respectively. Suitable enzyme formulations are been marketed by detergent manufacturers in powder as well as liquid forms for domestic use.In developed countries, the use of enzymes based detergent formulations has become very common [11]. Although, detergent industry is the largest industry with 25-30% of total sales, research targeting the comparative analysis and efficacy of various detergent brands has rarely been published.

With this background we have formulated our present research work to conduct a comparative study of different brands of detergents, containing various enzymes with those which do not contain enzymes.

II. MATERIALS AND METHODS

1. Detergents- The following detergents were used in order to identify their mode of action.
They were further classified into two groups based upon their composition.
(A). Detergents that contain enzymes (Brands)
1. A1; 2. A2; 3. A3; 4. A4; 5. A5
(B). Detergents with unknown composition (Brands)
1. B1; 2. B2; 3. B3; 4. B4; 5. B5

2. STAINS
The stains employed while performing the experiment were-

1. Pomegranate- The seeds of the fruit were taken and smashed on the cloth pieces to form the stain.
2. Pickle- A homemade pickle was taken and applied to the cloth pieces.
3. Ink- A standard quality ink was applied on to the cloth pieces and were dried.
4. Peanut butter- A readymade peanut butter available in the market was applied on to the cloth pieces.

5. Vermillion (kumkum)-A packet of vermilion was mixed with some water to form a paste and was applied to the cloth pieces.
6. Nail polish- A yellow color (any color of choice) nail polish was applied to the cloth pieces.
7. Black dye- A black dye available in the market was mixed with water and the paste was applied to the cloth pieces.
8. Egg yolk- Egg yolk from some eggs was collected and was applied on to the cloth pieces.
9. Soy sauce- The soy sauce available in the market was applied to the cloth pieces.
10. Grease- Grease was applied to the cloth pieces and dried. All the stained cloth pieces were dried completely before washing

3.CLOTH

The protocols followed for evaluating detergent performance were according to the methodology followed by [12,13]. A regular cloth piece (white) was taken and cut into uniform size (10cm x 10cm). A circle was drawn with a marker in order to differentiate the stained portion from the unstained portion. Various stains were applied on the cloth pieces in triplicates (Fig. 1). Stain removing capacity of different detergents was achieved by comparing the two categories of enzymes *viz*., (A) Detergents with enzymes and (B) Detergents with unknown composition. A total of 10 different controls were prepared by applying the stain on measured size of cloth. Beakers (200 ml) were taken and filled with 100mL of water. To each beaker 1 spatula of detergent (weighing, 1.20g approximately) was added and mixed thoroughly. The dried stained cloth pieces were soaked in the beakers for about 10 minutes (Fig. 2). After 10 minutes, the cloth pieces were handwashed, dried and preserved for observation (Fig. 3, 4)

III. RESULTS AND DISCUSSION

As depicted in Fig 5 and tables- 1.1, 1.2, 1.3, 1.4 and 1.5; the following observations were recorded for the detergents containing enzymes, indicating their stain removal efficiency-A1 detergent, exhibited 100% efficiency by removing 5 different stains, 95% of two stains, 90% of two different stains and least efficiency towards one stain. A2 detergent showed 100% efficiency by removing four different stains, 95% of two stains, 90%, 80%, 70%,50%, of other stains. A3 detergent was able to remove 100% egg yolk stain, 95%, 90% each of one stain respectively,80% of five stains, 75% of nail polish stain and 50% of Black dye stain. A4 detergent could remove two stains 100% efficiently, 95% of soy sauce, 90% of four different stains, 85%, 60%, 50% one of each stain respectively.A5 detergent could remove five different stains 100% efficiently, 95% of one stain,90%, 85%, 80% of each one stain respectively.

With regards to detergents with unknown composition, as shown in Fig 6 and tables- 2.1, 2.2, 2.3, 2.4 and 2.5, the following observations were recorded indicating their stain removal capacity- B1 detergent could effectively remove six different stains with 100% efficiency, one stain 90% efficiently, 80% of two stains, one stain upto 60%. B2 detergent could remove 100% efficiently three different stains, 95% , 90% of each two stains, 75%, 70%, 60% of each one stain respectively. B3 detergent could remove two different stains with 100% efficiency, 90% of two stains, 80% and 50% of three stains each respectively. B4 detergent could remove two stains 100%, 70%, 60% efficiently 95%, 90% , 75%, 50% of each one stain. B5 detergent could remove three stains 100% effectively, 95%, 85%, 80%, 70%, 50% of one each stain respectively and 60% of two stains.

Thus, A1 detergent was more effective than the other detergents with enzymes. It could remove most of the tough stains like nail polish, dye, ink, and pomegranate with 100% efficiency which other detergents could not remove. Whereas, among the detergents of unknown composition, B1 was found to be effective as it could remove most of the stains like pomegranate, peanut butter, Vermillion (kumkum), egg yolk, soya sauce and grease 100% effectively.

Experiments with locally available detergents targeting their stability and compatibility with various enzymes have been conducted by several researchers [9,10, 11, 12, 13]. Our results were in complete agreement with observations of other researchers.

Future prospects

Although, enzymes in detergents have provided new developments in detergent industries. Still, there is a requirement for environmentally safe laundry detergents with smaller quantities of organic and inorganic chemical ingredients. In addition to this core research into detergents with lesser requirement of water, energy and maximal washing performance at lower temperatures would lead to development of effective, laundry detergents. We need to explore eco-friendly alternatives which can be employed in cleaning the laundry efficiently without the use of hazardous and toxic chemicals.

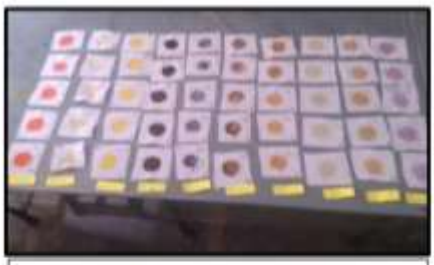

Fig. 1. Application of various stains -:1- Pomegranate juice, 2-Pickle, 3-Ink, 4-Peanut, 5-Vermilion. 6-Nail polish,7- Black dye, 8-egg yolk, 9-Soy sauce, 10-Grease

Fig. 2.Stained cloths soaked in different detergents.

Fig. 3.Stained cloths, treated with detergents having known composition,containing enzymes, dried and segregated.

Fig. 4. Stained cloths, treated with detergents having unknown composition, dried and segregated.

Table 1.1 STAIN REMOVING CAPACITY OF A1 DETERGENT

	% of stain removed	Stain applied
A1 DETERGENT	100%	Pomegranate, peanut butter, Vermillion, egg yolk, soy sauce
	95%	Pickle, Grease
	90%	Nail polish, Black dye
	70%	Ink

Table 1.2 STAIN REMOVING CAPACITY OF A2 DETERGENT

	% of stain removed	Stain applied
A2 DETERGENT	100%	Pomegranate, egg yolk, soy sauce, Grease
	95%	Peanut butter, vermillion
	90%	Nail polish
	80%	Black dye
	70%	Pickle
	50%	Ink

Table 1.3 STAIN REMOVING CAPACITY OF A3DETERGENT

	% of stain removed	Stain applied
A3 DETERGENT	100%	Egg yolk
	95%	Soy sauce
	90%	Peanut butter
	80%	Pomegranate, pickle, Ink, vermilion, Grease
	75%	Nail polish
	50%	Black dye

Table 1.4 STAIN REMOVING CAPACITY OF A4 DETERGENT

	% of stain removed	Stain applied
A4 DETERGENT	100%	Peanut butter, egg yolk
	95%	Soy sauce
	90%	Pomegranate, pickle, ink, vermilion
	85% 60% 50%	Grease Black dye Nail polish

Table1.5 STAIN REMOVING CAPACITY OF A5 DETERGENT

	% of stain removed	Stain applied
A5 DETERGENT	100%	Pickle, peanut butter, egg yolk, soy sauce
	95% 90%	Vermilion ,pomegranate Grease
	85% 80% 60%	Black dye Nail polish Ink

Table 2.1 STAIN REMOVING CAPACITY OF B1 DETERGENT

	% of stain removed	Stain applied
B1 DETERGENT	100%	Pomegranate, peanut butter, vermilion , egg yolk, soy sauce, grease
	90%	Pickle
	80% 60%	Nail polish, black dye Ink

Table 2.2 STAIN REMOVING CAPACITY OF B2 DETERGENT

	% of stain removed	Stain applied
B2 DETERGENT	100%	Peanut butter, egg yolk, soy sauce
	95%	Grease, pomegranate
	90%	Pickle, vermilion
	75% 70% 60%	Nail polish Black dye Ink

Table 2.3 STAIN REMOVING CAPACITY OF B3 DETERGENT

	% of stain removed	Stain applied
B3 DETERGENT	100%	Egg yolk, soy sauce
	90%	Peanut butter, grease
	80%	Pomegranate, pickle, vermilion
	50%	Ink, nail polish, black dye

Table 2.4 STAIN REMOVING CAPACITY OF B4 DETERGENT

	% of stain removed	Stain applied
B4 DETERGENT	100%	Egg yolk, soy sauce
	95% 90%	Peanut butter Grease
	75% 70%	Vermilion Pomegranate, pickle
	60%	Nail polish, black dye
	50%	Ink

Table 2.5 STAIN REMOVING CAPACITY OF B5 DETERGEN

	% of stain removed	Stain applied
B5 DETERGENT	100%	Egg yolk, soy sauce, grease
	95%	Peanut butter
	85% 80% 70% 60%	Pickle Pomegranate Nail polish Vermilion, Black dye
	50%	Ink

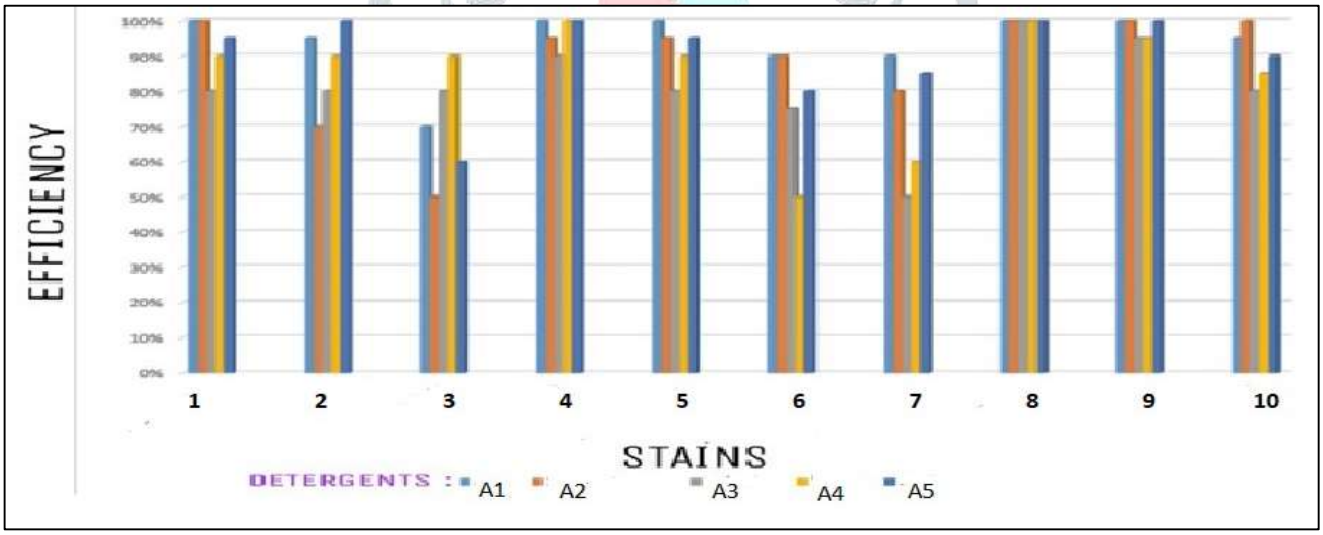

Fig. 5 STAIN REMOVING CAPACITY OF DETERGENTS WITH ENZYMES

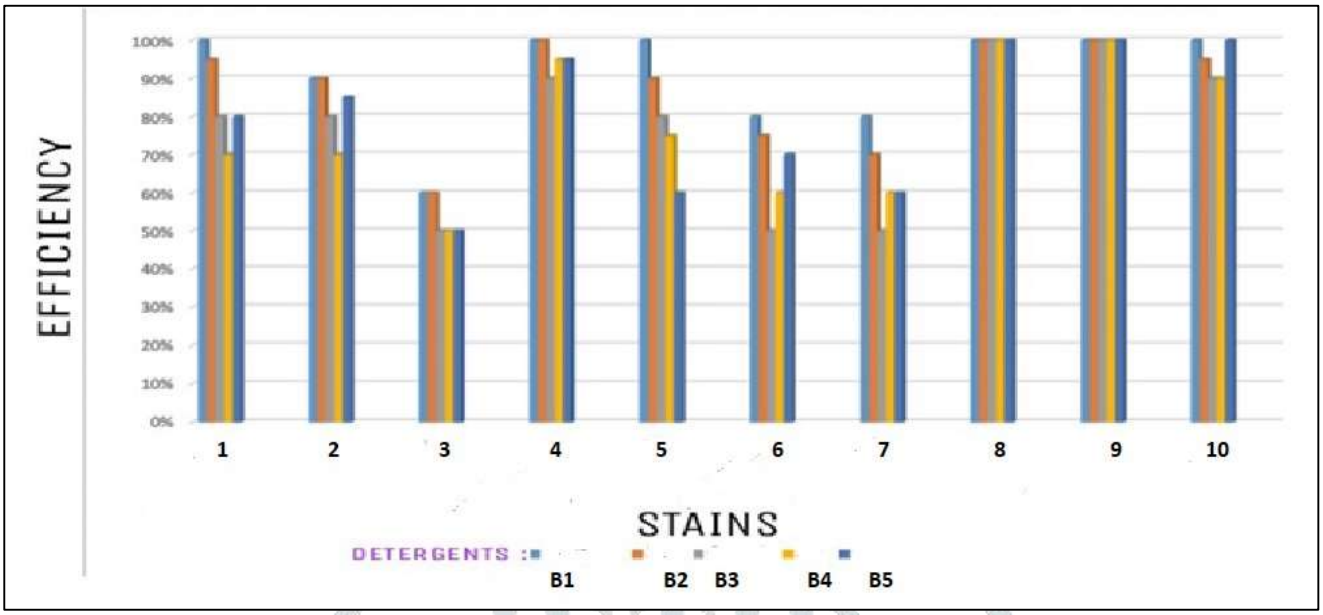

Fig. 6 STAIN REMOVING CAPACITY OF DETERGENTS WITH ENZYMES

Stains -:1-Pomegranate juice, 2-Pickle, 3-Ink, 4-Peanut, 5-Vermilion. 6-Nail polish, 7- Black dye, 8-Egg yolk, 9-Soy sauce, 10-Grease

IV. ACKNOWLEDGEMENT

The authors are thankful to Principal Sister Amrutha, St. Ann's College for women, for providing the necessary laboratory facility and for financial assistance.

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A CLINICOPATHOLOGIC CASE STUDY OF PARKINSON'S DISEASE IN HYDERABAD

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Abstract:

Parkinson's disease (PD) is a common neurodegenerative disorder affecting patients in large numbers throughout the world and describes as a syndrome that is characterized by both tremors and rigidity, and is usually asymmetric in that it affects one side of the body more than the other. Symptoms also include bradykinesia, which is slowed ability to start and continue movements and adjust the body's position. Although motor dysfunction defines the disorder, it also involves other symptoms such as cognitive or psychiatric changes and sleep disturbances.This research paper studies about a female individual who is diagnosed with Parkinson's disease and gives a brief emphasis on the disease.

Key words: Disease, impairment, tremors, Genetic disorder.

Introduction:

Parkinson's disease is a neurodegenerative disorder, which leads to progressive deterioration of motor function due to loss of dopamine producing brain cells. The cause of Parkinson 's disease is unknown, but researchers speculate that both genetic and environmental factors are involved.

Primary symptoms include stiffness, slowness, impaired balance and later on a shuffling gait. Secondary symptoms include depression and anxiety.

Many of the individuals with Parkinson's disease are diagnosed when they are 60 years old or older, but early-onset of Parkinson's disease also occurs. Several staging systems for Parkinson's disease exist depending upon the organization that treats and investigates the disease. The Parkinson's Foundation supports five stages.

Stage 1. Symptoms are mild and do not interfere with the person's quality of life.

Stage 2 Symptoms worsen and daily activities become more difficult and take more time to complete.

Stage 3 is considered mid-stage Parkinson's disease. The individual loses balance, moves more slowly, and falls are common. Symptoms impair daily activities, for example, dressing, eating, and brushing.

Stage 4. Symptoms become severe and the individual needs assistance in performing daily activities.

Stage 5 is the most advanced stage of Parkinson's disease. The individual is unable to walk and will need full time assistance for living.

Parkinson's disease is the most common neurodegenerative disorder and the most common movement disorder. Characteristics of Parkinson's disease are progressive loss of muscle control, which leads to trembling of the limbs and head while at rest, stiffness, slowness, and impaired balance. As symptoms worsen, it may become difficult to walk, talk, and complete simple tasks.

The progression of Parkinson's disease and the degree of impairment vary from person to person because of incomplete penetrence and variable expressivity due to several environmental stress factors and life style. Many people with Parkinson's disease live long productive lives, whereas others become succumbed much more quickly. Complications of Parkinson's such as falling-related injuries can cause premature death. However, studies of populations with and without Parkinson's disease, when compared, suggest the life expectancy for people with the disease is about the same as the general population.

Most of the individuals who develop Parkinson's disease are 60 years of age or older. Since overall life expectancy is rising, under improved medical management and treatment, the number of individuals with Parkinson's disease will increase in the future. Adult-onset Parkinson's disease is most common, but early-onset Parkinson's disease (onset between 21-40 years), and juvenile-onset Parkinson's disease (onset before age 21) can occur in rare circumstances, which could be strongly genetic and familiar.

Descriptions of Parkinson's disease date back as far as 5000 BC. Around that time, an ancient Indian civilization called the disorder Kampavata and treated it with the seeds of a plant containing therapeutic levels of what is today known as levodopa. Parkinson's disease was named after the British doctor James Parkinson, who in 1817 first described the disorder in detail as "shaking palsy."

Case Report:

A 73 year old female along with her husband resides in Hyderabad, Telangana. In 2015, she began experiencing severe pain in the joints of her limbs and also had a little difficulty in walking. So she was mis-diagnosed to be arthritis patient and had a medication for it. But later, she showed slight tremors in the hands and an impaired walking. The difficulty in walking was seen in the initiation of walking and as soon she started walking, she stopped forward with imbalanced steps and fell forwards. Her movements became restricted and slow, on account of frequent falls.

Her family consulted a general physician who then referred her to a Neurologist. The family showed no history of this disease, when pedigree is analysed. She was examined based on her previous medical records

and advised brain scans (CT Scan &MRI). The evaluation also included the testing of muscle co-ordination for walking and other motor tasks involving both hands and legs.

In June 2017, she was diagnosed with Parkinson's disease. Now, the rigidity of the muscles worsened and her movements ceased. She is completely confined to bed and an attendant is appointed to take care of all her daily needs. Since she has difficulty in swallowing, she is always on liquid diet; signs of dementia are also evident. No history of Hypertension and diabetes is recorded.

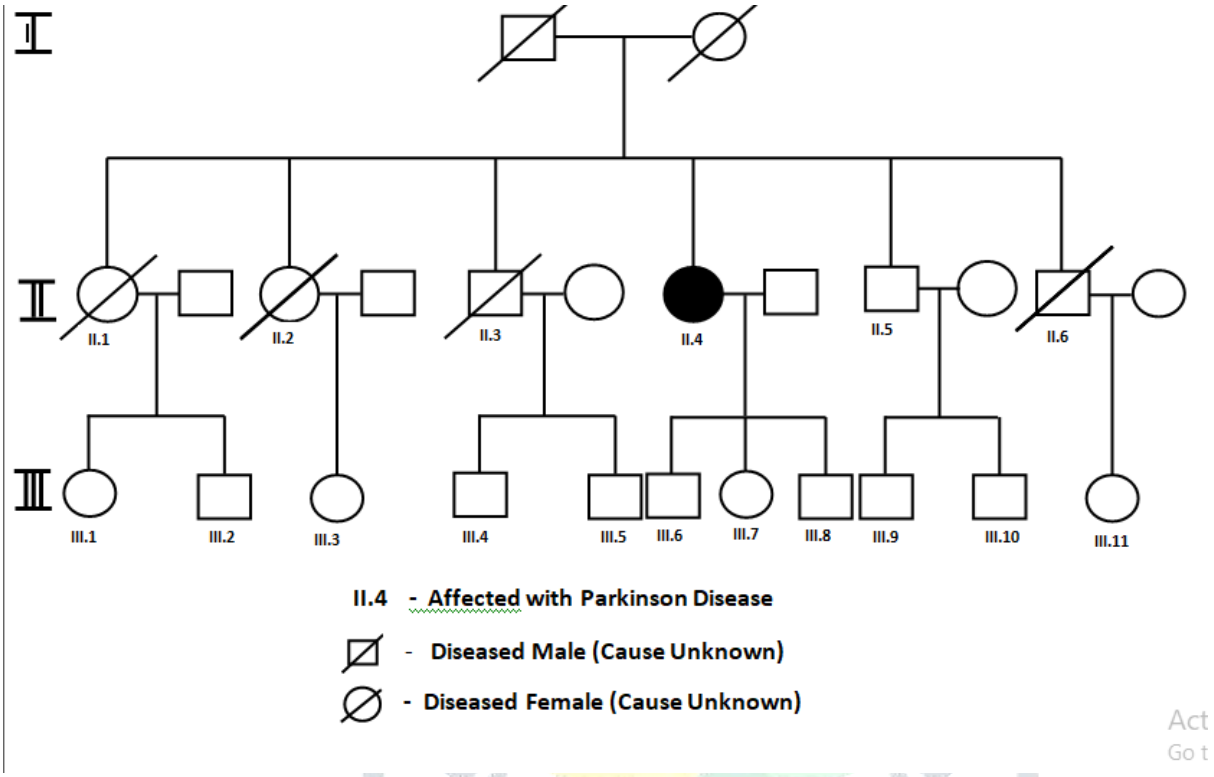

Fig. showing Pedigree of three generations of the family

Discussion :

Since the Pathophysiology of Parkinson's is very complex and multifactorial, the proven ways to prevent the disease also remain a mystery. Some research has shown that regular aerobic exercise might reduce the risk of Parkinson's disease. Some other research has shown that people who drink caffeine — which is found in coffee, tea and cola — get Parkinson's disease less often than those who don't drink it. However, it is still not clear whether caffeine actually protects us from the effects of Parkinson's, directly or indirectly. is related in some other way. Currently there is not enough evidence to suggest drinking caffeinated beverages to protect us from the effects of s Parkinson's. Green tea is also related to a reduced risk of developing Parkinson's disease.

Conclusion:

With proper treatment, most of the individuals with Parkinson's disease can lead long, productive lives for many years after diagnosis. The life expectancy is about the same as people without the disease.

Acknowledgment

We would like to thank the family of the patient for their valuable time and co-operation in willingly giving the complete information for the case study.

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Consumption of Junk foods among College Going Girls

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ABSTRACT: *Junk food is a pejorative term for food containing a large number of calories from sugar or fat with little fibre, protein, vitamins or minerals along with harmful preservatives/chemicals. In recent decades junk food consumption has drastically increased among adolescents with a concurrent rise in epidemics like obesity, cardiovascular disease, and many other chronic health conditions. Adolescence is a crucial life stage wherein the caloric demand of the body is the highest. .This being one of the many reasons contributing to unhealthy food choices, eating outside the home (at restaurants), and sedentary behaviors are seen. Thus there is a growing concern for the morbid consumption of junk foods by adolescence.*

The present study was undertaken in the year 2015-16 which assesses the knowledge and practice of Junk Food consumption among the students of St.Anns College of Age groups 18-21.

A Self-framed pretested questionnaire was used so to collect the data. The main findings conclude that about 23% of the students consume burgers while the majority of the students, 39% consume carbonated drinks and under that it was found out that 30% of them chose thumbs up. Consumption levels gradually rise throughout the day and peak at evening after 6pm i.e. tea time. It was also found that 39% were consuming fast foods 3-4 times a week.

The majority 72% of the respondents reported that they consume junk food based on emotions and also that the taste of the food being delicious (37%).

The results show the need for nutrition counseling regarding a balanced diet and the harmful effects of junk food which might not only reduce but also would help curb the fast food addiction.

Key words: Junk food; Adolescents; young adults; St.Anns College;

I. INTRODUCTION

Adolescence is a period of tremendous physiologic, psycho logic, and cognitive transformation during which a child becomes an adult. This is the age where adolescents are highly impulsive, with their decisions being based on emotional rather than rational contexts. Psychosocial development, increased caloric needs and financial independence is what often leads adolescence to make bad food choices.

Thus, adolescents are at risk for nutritional problem both from a physiological and a psychological standpoint. Junk Foods loaded with empty calories and harmful preservative provide adolescents a convenience of satisfying hunger and taste, thereby making it their first choice to food/snack on a daily basis leading to its morbid consumption.

1.1 ADOLESCENCE CAN BE DIVIDED INTO 3 STAGES

Early adolescence (11-14years of age) is characterized by the onset of puberty and increased cognitive development.
Middle adolescence (15-17years of age years) is characterized by the increased independence and experimentation.
Late adolescence (18-21years of age) is the time for making important personal and occupational decisions.

1.2 DEFINITON OF JUNK FOOD

Andrew F. Smith, in his book, *Encyclopedia of Junk Food and Fast Food*, defines junk food as "those commercial products, including candy, bakery goods, ice cream, salty snacks, and soft drinks, which have little or no nutritional value but do have plenty of calories, salt, and fats. While not all fast foods are junk foods, most are. Fast foods are ready-to-eat

foods served promptly after ordering. Some fast foods are high in calories and low in nutritional value, while other fast foods, such as salads, may be low in calories and high in nutritional value.

Junk food is a term for food that is of little nutritional value and often high in fat, sugar, salt, and calories. Junk foods typically contain high levels of calories from sugar or fat with little protein, vitamins or minerals. Most of the junk foods are rich in fats and poor in mineral nutrients. It is a bad combination of sugar, fat and chemical preservatives.

Common junk food among adolescents these days include burger, fries, biscuits, Fast food, chips, candy, gum, sweet desserts, sugary carbonated beverages. What is and is not junk food can also depend on the person's class and social status, with wealthier people tending to have a broader definition while lower-income consumers may see fewer foods as junk food, especially certain ethnic junk foods. Ethnic junk foods like fried murkuls, chidwa and fried sweets etc, are often not perceived as unhealthy options for daily consumption due to their traditional preparations and cultural relevance. It is this clouding of perception and lack in understanding the long term consequences of junk food consumption that the adolescent makes these bad food habits.

Evidence from an exploratory study in India suggests that the young Indian consumer has passion for visiting fast food outlets for fun and change [(2)]. This shows that apart from taste other factors also contribute to junk food consumption, each adding to the number of issues to tackle. One such issue is that of the media advertisements that bombard the young with a variety of junk food options and introduce them to attractive food items for them to try. A study on fast food consumption pattern among high school bys in Mangalore India reveals that Majority of the participants were introduced to fasts foods through television commercials[(3)]

Other reasons for selecting junk food by teens include faster to consume, faster to prepare, peer influences, and lack of other healthy options of convenience foods in the market. It is also seen that girls consume more junk food than boys. [(4)].

Schools and colleges that have shops surrounding them provide students with various junk food choice to chose from which otherwise wouldn't be available in the canteens or at home, thereby increasing the frequency of junk food consumption[(5)]. Globalization of fast food has provided the flexibility of having many consumption alternatives at reasonable prices. The fast food chains have been, innovative and forceful at inviting customers out of their kitchens up to fast food centers. Balanced diet has been replaced by junk or fast foods not only by young generation but also people from all age group, not only changing their everyday food habits but bringing about change in culture and taste perception.

Awareness of the ill effects of junk foods lacks in the society. The fascination with western food culture and with various popular western food outlets promoting fast foods has increased the consumption of junk foods by Indian society now more than ever. India participated in a multi-country study on 72,900 children (6-7 years) from 17 countries and 199,135 adolescents (13-14 years) from 36 countries consumption status was considered as frequently (once/twice a week) a very frequently (three or more per week). This cross sectional study has found that 22.6% and 4.2% children consume fast food frequently or very frequently, respectively. In total 38.7% of adolescents reported frequent fast food consumption and 12.6% replied very frequent consumption [(6)].

Habits start young and depend on the environment (home and school/college) to cultivate healthy habits in adolescents. It is thus imperative that good food habits be taught both at school and home.

1.3 HARMFUL INGREDIENTS JUNK FOODS

1. PALM OIL: These are evil anti-nutrients in the form of Trans fats which help packaged foods to stay "fresh," meaning that the food can sit on the supermarket shelf for years without ever getting stale or rotting.

2. ARTIFICIAL SWEETENERS: Aspartame (NutraSweet, Equal), saccharin (Sweet'N Low, SugarTwin), and sucralose (Splenda) are some examples of artificial sweeteners added to our foods which may be even harder on our metabolic systems than plain old sugar.

3. SODIUM BENZOATE AND POTASSIUM BENZOATE: These are preservatives which sometimes are added to soda to prevent mold from growing, but benzene is also linked with its serious thyroid damage.

4. BUTYLATED HYDROXYANISOLE (BHA): BHA is another potentially cancer-causing preservative, but it has been deemed safe by the FDA [(7)].

5TRANS FATS: Trans-Fats are partially hydrogenized vegetable oils. They increase the shelf life of food and add crisp, texture to food. These trans-fats are worst substances which we consume in name of food. Consumption of trans-fats has shown to increase the risk of coronary heart disease.

6. NITRITE SALTS: Nitrite Salts are added to foods such as preservatives to keep taste, smell and texture for longer time, but these preservatives are carcinogenic and have many more harmful effects. These are added in processed meat, smoked fish, ham and sausages.

7. BUTTER FLAVOURING: Buttered-flavored chemical called diacetyl is used in microwave popcorn, margarine, snack foods, baked goods and candies, giving them an appetizing smell and buttery taste. These chemicals increase the risk for Alzheimer's disease.

8. HFCS: High Fructose Corn Syrup (HFCS) increases triglycerides, boosts fat storing hormones and leads to obesity[(8)]

9. FOOD COLOURING: Food Coloring agents are certain chemicals which give color and tasty look to food. These chemicals are byproducts of coal tar and other chemicals that can increase the risk of certain cancers [(9)].

1.4 ILL EFFECTS OF JUNK FOODS

impact of fast food consumption on physical health [(10, 11, 12)]:

Consequences	Underlying mechanism
Obesity	Being high in fat content, high in sugar in liquid form and low in fibre junk food induces gorging that leads to obesity. With the high consumption of food ,the brain gets "hit" with the fatty acids, and the fat molecules cause the brain to send messages to the body cells, warning them to ignore the appetite-suppressing signals from leptin and insulin, hormones that are involved in weight regulation. Since the body does not get the signals that it is satiated it leads to over eating. Energy dense foods after oxidation in the body produces Acetyl Co A enzyme whose excess amount channelized out of mitochondria and participates in other metabolic pathways leading to fatty acid synthesis and biosynthesis of cholesterol Eating too much junk food is one of the factors that have contributed to the children hidden obesity epidemic
Hypertension	High saturated fat causes atherosclerosis which is responsible for clogging of arteries as early age of 30 years and responsible for hypertension at early age. Sodium is known to affect rennin angiotensin systems in kidney which produces vasoconstrictive effects on arterioles, leading to development of high blood pressure.
High incidence of non communicable diseases	High fatty acids and cholesterolemia cause narrowing of coronary arteries of heart and brain leading to CHD and stroke. Trans fats clog up human arteries and cause plaque to build up contributing to heart disease and stroke symptoms.
Gastritis	Excess fats and oils and spices are irritant to gastric mucosa and leads to excess production of Hcl.
Effect on Kidney	Since sodium excretion takes place through kidney high sodium load may be dangerous
Effect on liver	High cholesterol also effects liver on the long run when it is metabolised it puts strain on the liver thus damaging it eventually
Allergy manifestations (viz. Asthma, rashes and hyperactivity)	These conditions are due to flavouring and colouring present in fast foods.
Fatigued feeling and craving for sugar	High refined sugar puts pancreas under stress and it create high amount of insulin to prevent dangerous spike in blood sugar level because fast and junk food do not content adequate amount of good carbohydrate and protein, the blood sugar level suddenly drops after eating resulting with grumping fatigued felling craving for sugar.
Type 2 diabetes mellitus	Dense sugar content of fast foods can cause type 2 diabetes mellitus[(13)]
Cancers	Inedible, harmful and carcinogenic substances are present in fast foods when children eat from puberty affects their risk of prostate and breast cancer

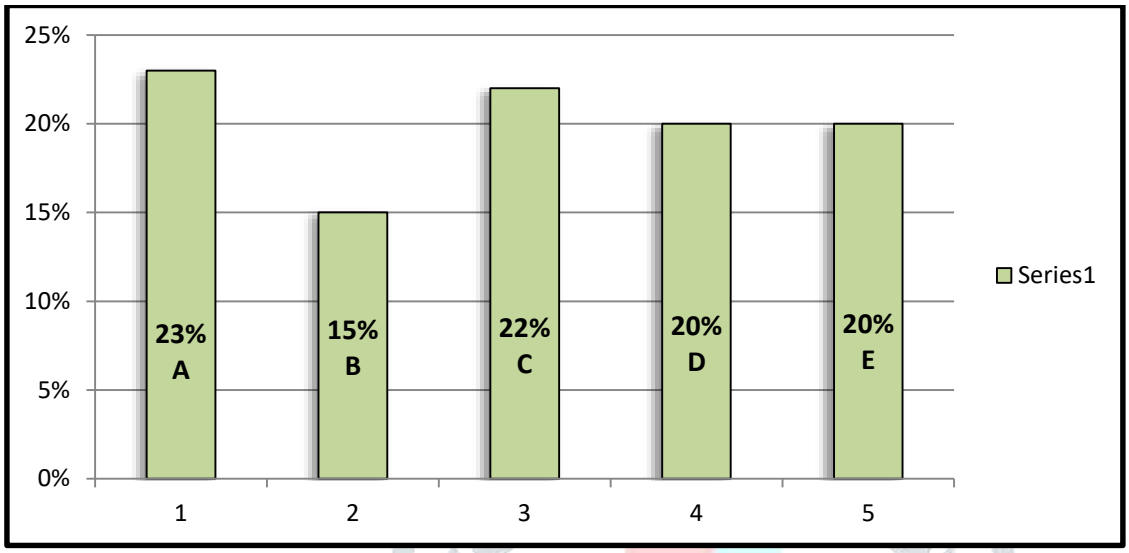
II. SUBJECTS AND METHODS

The present survey was conducted in ST ANNS COLLEGE FOR WOMEN, MEHDIPATNAM, HYDERABAD, TELANGANA STATE. The sample population was chosen for the students in the college. All the participants were in the age group of 18-21 years and questionnaires were distributed and data was collected (from 200) students between2015-2016. A questionnaire comprising of questions pertaining to the frequency of consumption of junk food, the type of junk food consumed and the factors influencing the consumption of such food were prepared and counted manually based on the options specified for each question framed.

III. RESULT AND DISCUSSION:

1. Results showed that amongst the list of junk foods to be chosen according their priority, the majority of the College goings girls chose Burger (23%), followed by 15% chose pizza, 22% to French fries, 20% chose noodles, and 20% chose other junk foods. So from the study, the consumption of junk food is common among the third stage of adolescence.
2. Interestingly, the carbonated soft drinks (39%) were the main beverages usually consumed with fast food meals by both adolescent and young adult girls and among other beverages 10% of students chose lemonade, 16% of students chose water, 13% of students chose fruit juice.
3. As most of the students prefer carbonated drinks, the beverage that is most commonly selected was checked. Of which ,a significantly higher rate of 20% consume coca cola, 16% consume Pepsi, 17% consume sprite, 30% consume thumbs up and remaining 16% consume whatever they like.

4. On the other hand, the students were questioned about their preference about the type of chocolate, where 23% of people prefer dairy milk, 25% prefer Kit kat, 25%prefer Bourneville and 25% prefer ferrero rocher.
5. It was seen that the consumption levels gradually rise throughout the day and peak is at evening after 6pm i.e. tea time.
6. Finally, junk food was found to be consumed by 29% of the adolescent girls 5 times or more per week. More over 39% were consuming 3-4 times a week. And in total 32% of the respondents eat at least 1-2 times in a week.
7. A higher rate of adolescents (72%) agrees that they consume junk food based on emotions; around 36% disagree to the question.
8. The chief reason for consumption of junk food is seen that 37% students consume junk food as they found it tasty. However, 26% students were influenced by the advertisements, 24% of consumption was as a result of to lack of cooking skills and 13 % were constrained due to limited time.

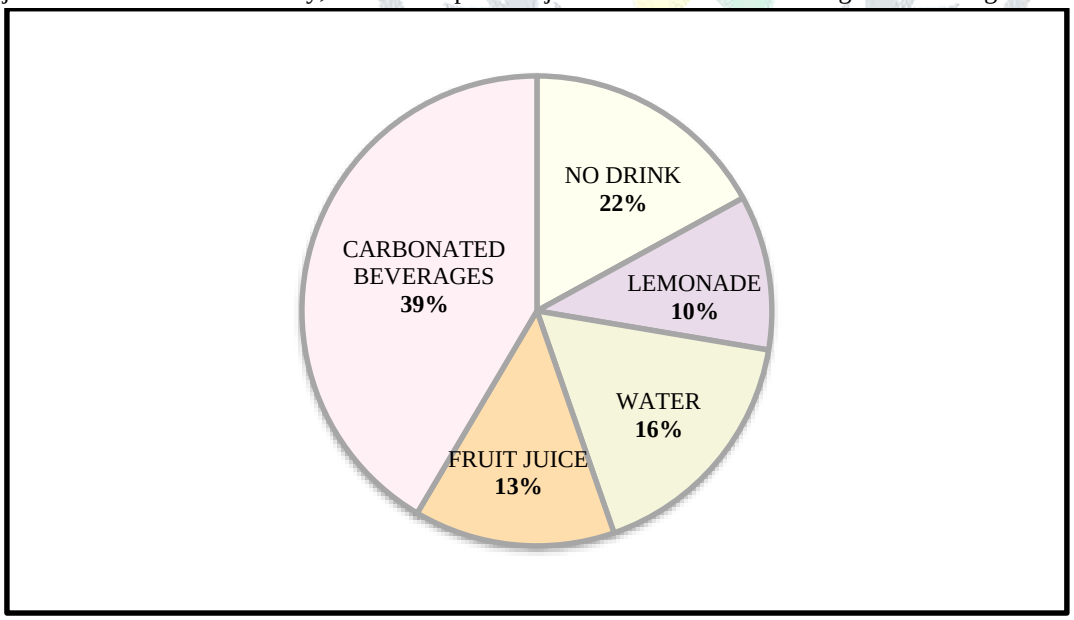


A. BURGER
B. PIZZA
C. NOODLES
D. FRENCH FRIES
E. OTHERS

Figure1 list of junk foods

ANSWER:

The priority of consumption of junk foods is checked by giving different options for choosing the junk food. From the results, it found that 23% consume burger, 15% consume pizza, 22% consume French fries, 20% consume noodles, and 20% consume other junk foods. So from the study, the consumption of junk food is common among the third stage of adolescence.

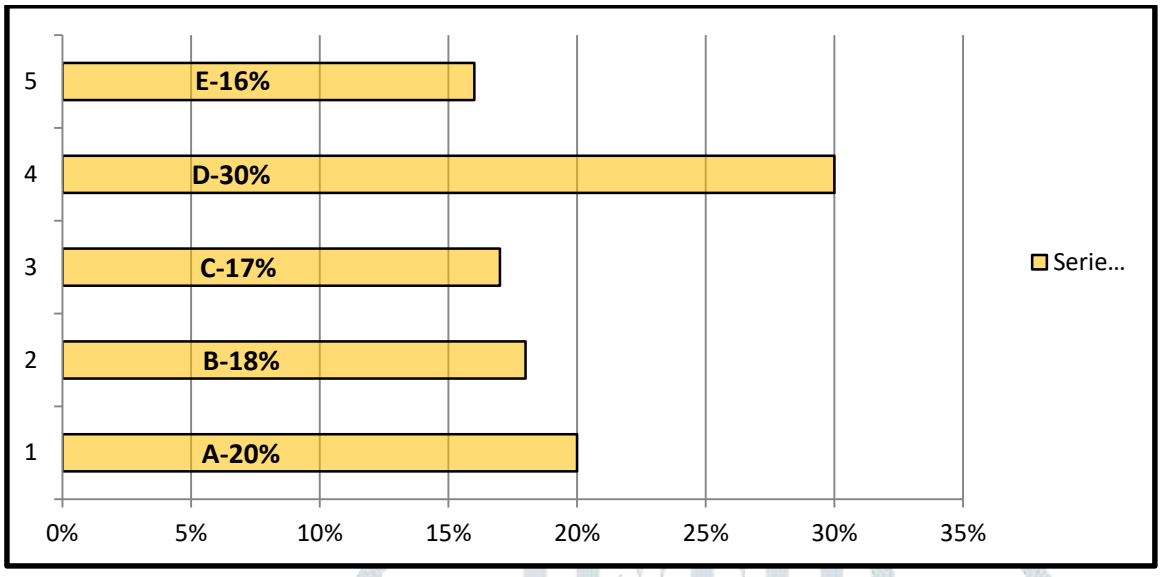


A. LEMONADE
B. WATER
C. FRUIT JUICE
D. CARBONATED DRINK
E. OTHERS

Figure 2 what beverages do you usually order with junk foods?

ANSWER:

The survey found that, 10% of students consume lemonade, 16% of students consume water, 13% of students consume fruit juice and 39% consume carbonated drinks.

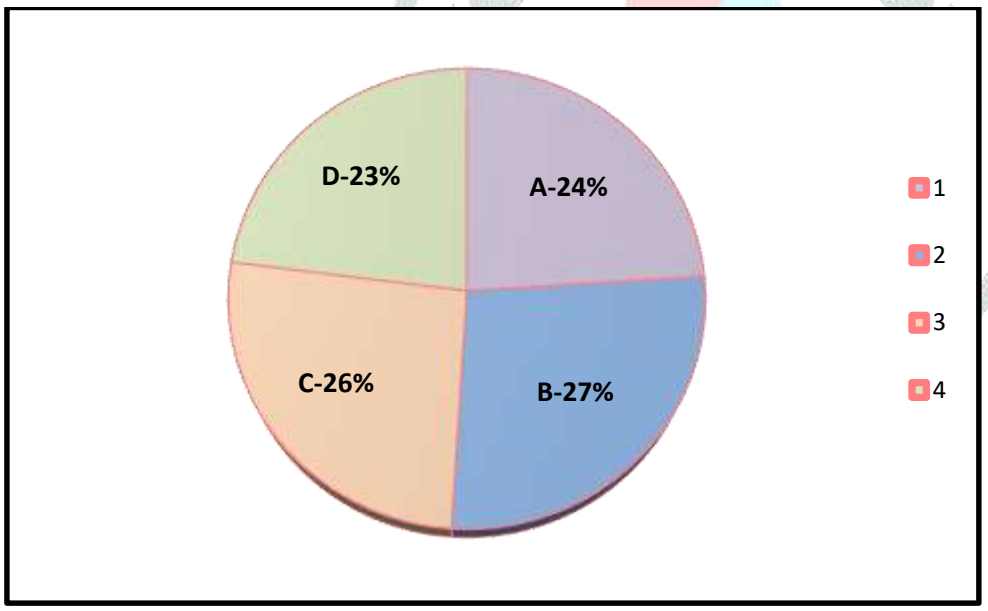


A. COCO COLA
B. PEPSI
C. SPRITE
D. THUMBS UP
E. OTHERS

Figure 3 list of carbonated drinks

ANSWER:

Then as the most of the students prefer the carbonated drinks has been checked. From the survey, it is found that 20%consume coca cola, 16% consume Pepsi, 17% consume sprite, 30% consume thumbs up and remaining 16% consume whatever they like.

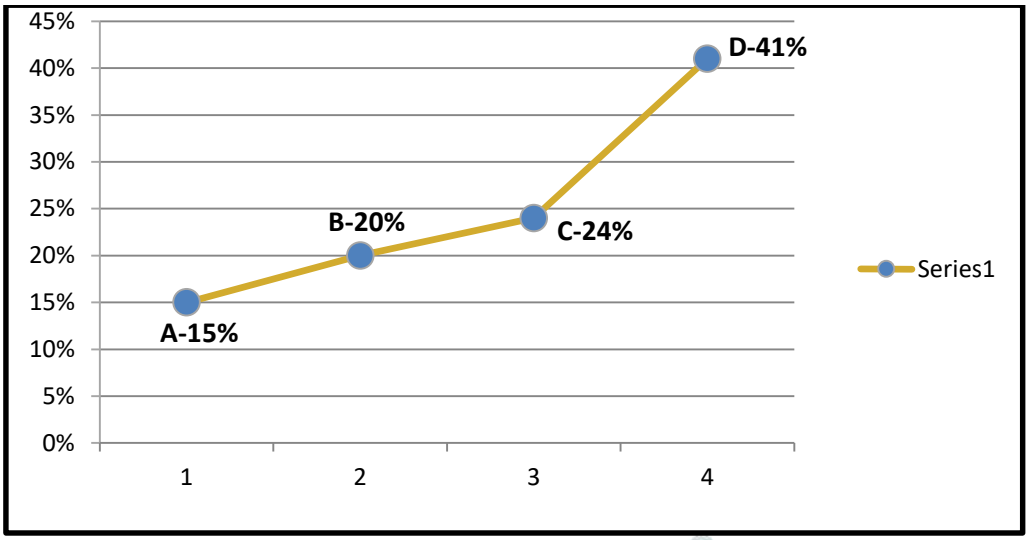


A. DARK CHOCOLATE
B. LIGHT CHOCOLATE
C. MILK CHOCOLATE
D. OTHER PLEASE SPECIFY

Figure 4 what kind of chocolate do you consume?

ANSWER:

The students were again questioned about their preference about the type of chocolate 23% of people consume dairy milk, 25% consume Kit kat, 25%consume Bourneville and 25% consume ferrero rocher. It's the socio economic status that often dictates the choice of the food item. . According to a qualitative assessment of nutrition knowledge levels and dietary intake of school children in Hyderabad children from high socio economic status preferred fast foods like dairy milk, kitkat etc to traditional foods despite their better nutrition knowledge [16].

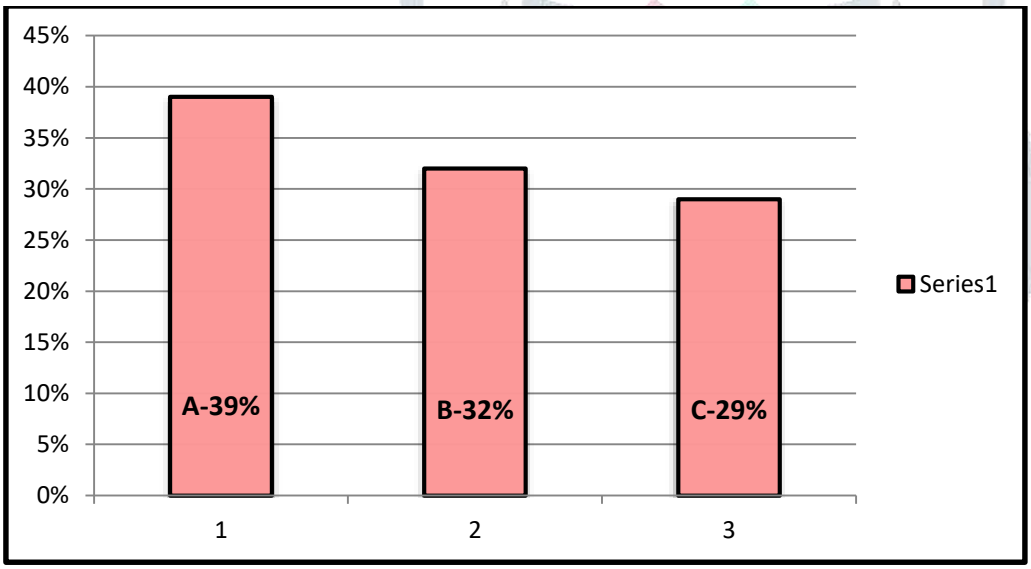


A. BEFORE 11 AM
B. BETWEEN 11 AM TO 2 PM
C. BETWEEN 2PM TO 6PM
D. AFTER 6PM

Figure 5 what time do you eat junk food?

ANSWER:

Consumption levels gradually rise throughout the day and peak is at evening after 6pm i.e. tea time. Finding from a study conducted on college students (20- 27 years) from NCR region revealed that going for snacks has been most preferred time for visiting fast food outlets followed by dinner and lunch[17].This is due to the decrease in energy levels and fatigue due to lack of eating a wholesome balanced diet.

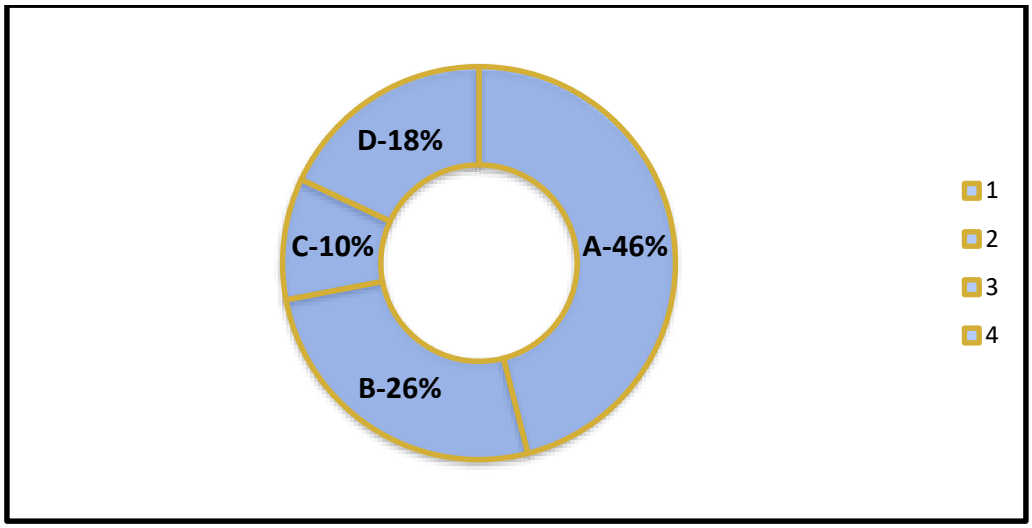


A- 3-4 TIMES A WEEK
B- 1-2 TIMES A WEEK
C- 5 TIMES A WEEK OR MORE

Figure 6 frequency of consumption of junk foods

ANSWER:

Around 29% were found to be consuming junk food 5 times or more per week, 39% were consuming 3-4 times a week and 32% for 1-2 times a week.

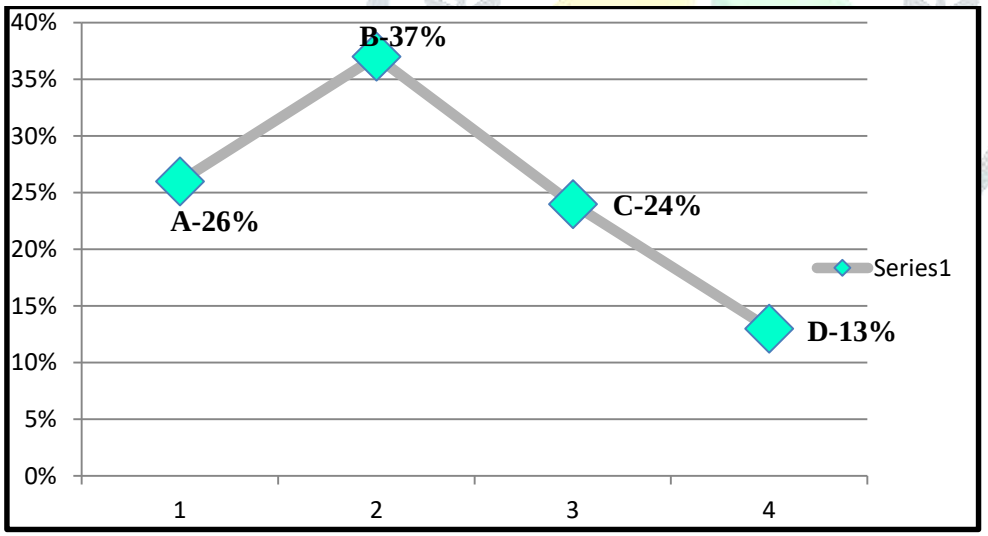


A. AGREE
B. STRONGLY AGREE
C. DISAGREE
D. STRONGLY DISAGREE

Figure 7 does intake of junk food depends on emotional factors like happiness/sadness?

ANSWER:

While 72% agree that they consume junk food based on emotions, around 36% disagree to the question. The reason that junk fod effects the mood of these adolescents is that junk food has an addictive phenomenon. A research [10, 20] gives the following mechanism of the addictive phenomenon: "Ingredients of junk foods give great taste and make consumer addictive. Fats and sugar in combination are capable of producing a dopamine driven sugar of intense pleasure in people with propensity for addictive behavior. There is considerable similarity between dopamine production levels between drug addicts and junk food addicts. Addition to either one causes brain receptors receiving dopamine signals to lose their responsiveness. Thus in order to receive the same level of satisfaction there is need of increasing amount of addictive substance. Prolonged consumption of junk foods results in reduced activity in striatum of forebrain which register reward. Those on prolonged use of junk foods require ever increasing amounts of it to get the same high. Too much of junk food alters the chemistry of the brain and are addictive like cocaine. High fructose crone syrup (HFCS), monosodium glutamate (MSG), hydrogenated oils, refined salt and other chemical preservatives in processed junk food do the same thing to a person's brain just as cocaine does".



A- ADVERTISMENT
B- TATSTY
C- LACK OF COOKING SKILLS
D- LIMITED TIME

Figure 8 reason to choose particular junk food

ANSWER:

The chief reason for consumption of junk foods is 37% students found it tasty, while 26% students were influenced by the advertisements, 24% of consumption was as a result of to lack of cooking skills and 13 % were constrained due to limited time. Moreover the fast food joints use innovative techniques and attractive marketing tricks to lure the consumer to their outlets as a better option than the burdensome task of cooking food at home [18]. The fast food industry in India was estimated to be between Rs 6750- Rs 8000 cores [19] these industries rope in big celebrities to promote their junk foods, often with healthy gimmicks which rarely fall under the healthy tag, thus fooling the people in buying them. Studies show that eating food high sugar or fat results in neurochemical changes in the brain similar to those that develop in drug addiction. Increased stress levels cause the body to expend more energy, stimulating hunger for calorie dense substances.

IV. SUMMARY

- Consumption of junk foods is on the rise, with its morbid consumption comes an array of health consequences that affect the one consuming it
- These consequences both short term and long term can be deleterious.
- With adolescents being the major consumer, the health of the future citizens of the country is moving towards the peril of not one but several maladies and disorder.
- This paper studies the consumption and the frequency of junk food of college going girls
- A questionnaire was used to assess the students junk food eating pattern
- The results broadly suggested, that the consumption levels gradually rise throughout the day and peak is at evening after 6pm i.e. tea time. Thus ensuring the availability of healthy food items could overcome the need for junk food
- Junk food was found to be consumed by 29% of the adolescent girls 5 times or more per week, more over 39% were consuming 3-4 times a week and in total 32% of the respondents eat at least 1-2 times in a week. With this frequency identified an intervention of daily healthy meal prepping for the entire week could decrease the junk food consumption frequency
- A higher rate of adolescents (72%) agrees that they consume junk food based on emotions; around 36% disagree to the question. Educating adolescents about emotional effects on over eating and debunking the association of junk food and emotional well being might help with moody junk food binging.
- The chief reasons found from this study, for consumption of junk food are that 37% students consume junk food as they find it tasty. However, 26% students were influenced by the advertisements, 24% of consumption was as a result of to lack of cooking skills and 13 % were constrained due to limited time. Creating awareness by introducing healthy and tasty food options and teaching the importance of home cooked food is essential in decreasing the junk food consumption among students.
- Family and friends plays an important role in shaping the food choices adolescents makes [(21)]. Parent's reactions toward food often condition the child in forming a perception about certain foods [(22)]. Thus parents can help educate about the ill effects of junk food better to adolescents

V. CONCLUSION

A nutritious well balanced wholesome diet is a basic need of every human being for growth, development and maintaining good health. Many adolescents and young women during their meal time eat junk foods and are getting addicted to the taste of junk food. Junk foods are tasty but they have a low nutrient value and high calories. Junk foods are laced with colors which are often inedible, carcinogenic and harmful to the body. These foods can affect digestive system, its effect can emerge after many years. Adolescent drive for individualization means more opportunity to assert food of their choice and expand narrow healthy options.

The radical changes in economy, urbanization, media advertising, western influences, and dietary changes have all led to the increased consumption of junk food which has bought unparallel rise in lifestyle diseases, thus affecting the long term health of a large chunk of the population. This requires immediate action as unhealthy adolescents mean a unhealthy society.

Comprehensive nutrition interventions, awareness programmes, increase in more healthy options in the market coupled with reforms from the government can help to curtail the menace of fast food consumption. Advertising healthy snack options with reasonable price has been shown to have effect on buying healthy snack options [(23)]. Price reduction on low fat snacks and placement of low fat label enhance their consumption among adolescent population [(24)].

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DIABETES: THE SILENT KILLER

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ABSTRACT-The chronic metabolic disorder diabetes mellitus is a fast-growing global problem with huge social, health, and economic consequences. It is estimated that in 2010 there were globally 285 million people (approximately 6.4% of the adult population) suffering from this disease. This number is estimated to increase to 430 million in the absence of better control or cure. An ageing population and obesity are two main reasons for the increase. Furthermore it has been shown that almost 50% of the putative diabetics are not diagnosed until 10 years after onset of the disease, hence the real prevalence of global diabetes must be astronomically high. This study introduces the types of diabetes and diabetic complications such as impairment of immune system, periodontal disease, retinopathy, nephropathy, somatic and autonomic neuropathy, cardiovascular diseases and diabetic foot. Also included are the current management and treatments, and emerging therapies.

KEY WORDS: Type I or Juvenile diabetes, Type II or Adult Onset diabetes Causes and Medication.

INTRODUCTION

Diabetes is a chronic metabolic disease in which the either doesn't produce or doesn't fully utilize insulin. As a result, it cannot properly metabolize carbohyrdrates, and to a lesser extent, protein and fat. Glucose (sugar) builds up in blood; to get rid of the excess, the kidneys begin to excrete it in urine.

Although excessive is circulating, the brain and other tissues need it for the fuel are unable to use it. The body begins to breakdown the fat and protein in attempt to provide an alternate source of fuel, resulting in serious biochemical imbalances. In the meantime, the high level of glucose are damaging structures throughout the body, increasing the risk of complications such as heartattack, blindness, kidney failure, stroke and painful nerve problems. Despite effective treatments, diabetes is a leading cause of death.

There are two major forms: type I, in which body stops making insulin completely, and type II, in which the body produces inadequate insulin or is unable to use it fully. The first type also called insulin-dependent or juvenile diabetes, usually develops during first 20 years of life when islet cells in pancreas are destroyed and can no longer make insulin. Symptoms are frequent urination, weight loss, unusual thirst, weakness, fatigue and hunger.

Type II, also called non-insulin dependent or adult-onset diabetes, is most common among overweight older people, although it can occur in persons of normal weight. It develops more slowly than Type I; indeed, many indivisuals have the disease for years without knowing it. In addition to symptoms experienced in Type I diabetes, signs may include frequent infections, cramps and tingling sensation, slow healing, impotence in men, and chronic vaginitis in women.

The cause of diabetes is unknown, but researchers believe that Type I develops when the immune system destroys the islet cells. The disease tends to run in families, so there may be a genetic component.

OBJECTIVE

The objective of this study was focused on the prevalence of diabetes with reference to age and life style.

METHODOLOGY

The diabetic cases of different age groups were studied. Diagnosis is based on the blood test that measures blood glucose levels. Elevated blood glucose doesn't necessarily indicate diabetes, but it does call for more extensive testing. In general, a diagnosis is established if two separate blood tests, done after fasting for eight hours, show glucose levels of 140mg/dl. In borderline, a glucose challenge test may be ordered. This involves measuring glucose after fasting, and again after drinking sugar water.

A CASE IN POINT

According to a study, a person developed Type I diabetes, he was put on the standard regimen for that time-a strict diet and daily shot of lente insulin, a form that works for 18 to 24 hours. His urine sample was taken for glucose test each morning. Over the next few years, his diabetes went out of control. And the unstable diabetes was reflected in damage to his eyes and kidneys.

Blood glucose was measured instantaneously. Heretofore, urine sample was taken, but by the time glucose showed up in the urine, blood levels may have been dangerously high for hours or even days. After the results of a blood test, adjustments was made in his insulin dosage to avoid dangerous fluctuations. "If that didn't work, then he was one of the unlucky ones whose diabetes couldn't be controlled." His blood glucose had been checked several times a day, and a careful diary of test results, food intake, exercise, and other factors affecting insulin needs was maintained. Adjustments in the insulin dosage was made by calculating how much would be needed to metabolize a specific amount of food, and how to make further adjustments for exercise. He was shifted to a combination of insulins divided into three or more daily doses, which permitted further fine-tuning and adjustments to maintain normal blood glucose levels.

After nearly a decade, his diabetes remain in check. His kidney function has actually improved and there has been no further damage to his eyes.

DISCUSSION

There is no cure for either type of diabetes, but the disease can be controlled with a combination of therapies. People with Type I need regular insulin injections and special diet and exercise regimen. They must also measure their own blood sugar(see self-treatment).

More than 80 percent of people with Type II diabetes can control it with just diet and exercise, especially if they lose weight. Others may need oral hypoglycemic to increase insulin production and its effectiveness. These drugs include chlorpropamide (Diabnise), glipizide (Glucotrol), glyburide (Diaseta and Micronase), tolbutamide (Orinase), and tolazamide (Tolinase). A new Type II drug, acarbose (Precose), works by delaying the digestion of carbohydrates, resulting in a slower rise in blood glucose.

Patients with both types of diseases require extra medical care and should establish a close working relationship, usually an internist or endocrinologist. Because diabetes affects especially the heart, blood vessels, kidneys, nerves, and eyes, other specialists may be needed. For example, an ophthalmologist should be seen atleast every 6 to 12 months to check for diabetic retinopathy. If unchecked, this bleeding can lead to blindness.

Cardiovascular complications, such as high blood pressure and coronary artery disease, are particularly common in diabetes. a significant number of patients develop kidney failure, and require dialysis or a kidney transplant. Reduced circulation to the legs and feet may lead to theneed for vascular surgery or even amputation.

A study showed that maintaining normal blood sugar levels dramatically slows the progression of compliments. More doctors are now encouraging diabetic patients to follow a regimen that maintains blood glucose levels as near to normal as possible. This involves frequent glucose monitoring (at least four times a day), adjustment of insulin or other medication dosages, changes in exercise patterns, and alteration of timing, frequency, and content of meals and snacks.

To make insulin injections easier, there is now an insulin pump, which is carried in a pocket or worn in a belt. It can be programmed to administrator small amounts of insulin at specific times through a syringe left in place in the abdomen or other convenient site.

Alternative therapies are helpful as adjuncts to medical treatment.

Exercise Conditioning. This improves the body's ability to use insulin. Type I patients who exercise regularly can lower their insulin dosage and Type II patients can often eliminate the need for oral hypoglycemic. Exercise also improves circulation, and may help prevent leg and foot problems.

Homeopathy. Practitioners may prescribe phosphorus to help stabilize blood sugar levels.

Meditation, Self-Hypnosis, and Yoga. These other relaxation techniques can help lower the level of stress that may elevate the blood glucose.

Nutrition Therapy. The basic diabetic diet is described under self-treatment. In addition, many dietitians urge eating beans regularly, as they can help burnt the post-meal rise in glucose levels.

A diabetes diet is similar to the healthful diets now recommended for all people: Obtain most of your calories from complex carbohydrates, such as vegetables, legumes, fruits, and whole grains, and rely less on animal foods for protein. Avoid refined sugars and restrict fat and cholesterol intake to help reduce the risk of heart disease.

People with diabetes often have poor circulation and are susceptible to skin ulcers, especially on legs and feet. Fit shoes carefully to avoid corns and other foot problems that can develop into a series of infection. Also keep toe nails trimmed. If you have difficulty caring for your feet, see a podiatrist.

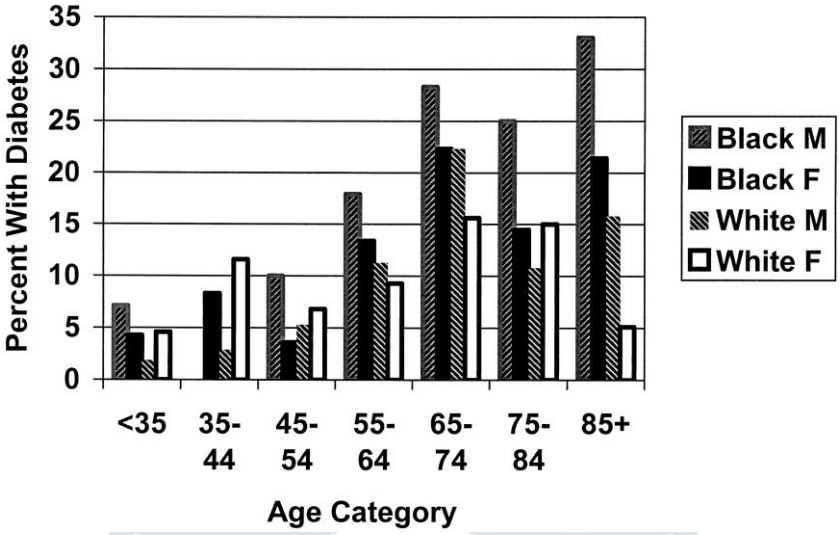
OTHER CAUSES OF HIGH BLOOD SUGAR

Certain medications can raise blood sugar. So too can disease affecting the pancreas. Pregnant women sometimes develop gestational diabetes, which can be detected with a blood glucose test.

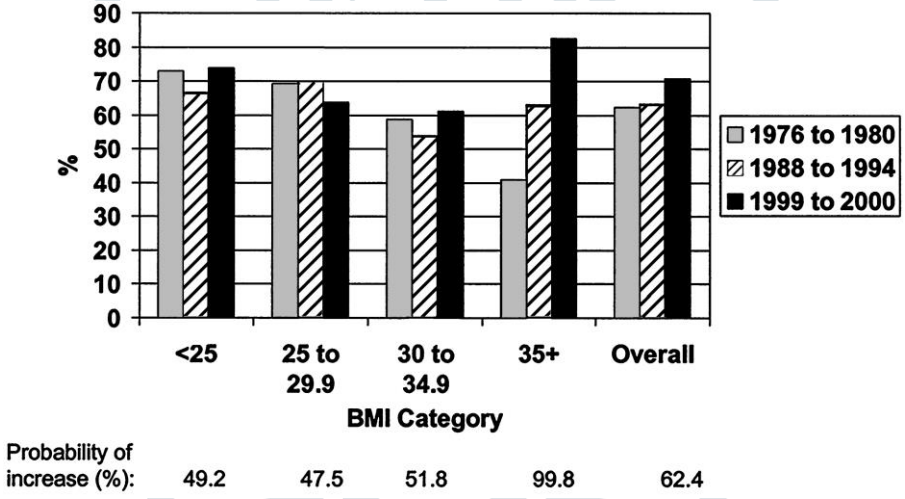
SIGNS OF AN INSULIN OVERDOSE

- A tingling sensation in the mouth, the fingers, or the other parts of the body.
- A cold clammy feeling.
- A buzzing in ears.
- Excessive sweating.
- A feeling of weakness or faintness.
- Headache.
- Hunger.
- Paleness.
- Abdominal pain.
- Irritability and a change in mood.
- Impaired vision.
- Rapid heartbeat and trembling.
- Sudden drowsiness.
- Sudden awakening from sleep, especially if it is accompanied by any of the above symptoms.

AGE GROUP V/S DIABETES



BMI V/S DIABETES



Probability of increase (%):	49.2	47.5	51.8	99.8	62.4

CONCLUSION

It was observed that the effect of diabetes with reference to age and life style will vary.

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EFFECT OF VERMICOMPOST ON ALGAL GROWTH

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ABSTRACT: Algae are simple plants that reproduce vegetatively by single cell division or fragmentation of colonies. Algae formation on pots and plug trays absorbs nutrients meant for plants and creates a barrier making it difficult for water to penetrate to the root zone. This will affect the quality and aesthetics of plants. Chemical algaecides kill algae in much the same way that weed killers kill undesired plants in your yard. Unfortunately, many the chemicals in algaecides do not target the algae specifically and can harm or kill any aquatic plants in your pond. Though some algaecide treatments will not kill your plants, they may stunt plant growth or have other negative effects. The extermination of algae is a problem, the methods to control algae can be expensive, cumbersome, environmentally unfriendly or all of these.The present paper aims at studying the effect of vermicompost on the algal Growth in plants.nine pots were taken and different herbs namely, Menthalongifolia,Coriandrumsativum and Hibiscus cannabinuswere grown in them out of which three were treated with common algaecide, three with vermicompost and three were left without treatment.It was observed that the plants which were treated with vermicompost were not effected by the algaeand the plants which were treated with algaecide also did not show the presence of algae but the plant growth was stunted whereas the pot which were left untreated showed growth of algae and very less growth of plants.

KEYWORDS:**Algae,vermicompost,growth,algaecide**.

INTRODUCTION:

Algae is a type of plant with no stems or leaves that grows in water or on damp surfaces.It reproduces vegetatively and also has a sexual cycle that produces zoospores. Spores are transmitted through water, air and mechanical movement and will germinate under the right environmental conditions. Algae most often develop when excess nutrients, usually caused by over-fertilization, are present, as well as the existence of excess moisture and light. Since Alga is an indicator organism, that means conditions are favourable for other plant disease pathogens to become established when it is present. It is also a breeding ground and food source for pests. It also causes a reduction of the germination rate of seeds and the growth. It results in reduced development of the seedlings, and there may also be an alteration to the quality and the productivity of crop plants.

Chemical algaecides kill algae in much the same way that weed killers kill undesired plants . Unfortunately, many of the chemicals in algaecides do not target the algae specifically and can harm the plants as well. Though some algaecide treatments will not kill your plants, they may stunt plant growth or have other negative effects. The chemicals are also hazardous to animals as well. It can be found on pots, potting media surfaces, soil, and even all over plant leaves and stems. Pots can be treated with some chemicals but they are very toxic to plants.Algae are a challenge to plant nutrition as they use water and fertilizer meant for plant growth, and an irrigation challenge because a dense algal mat can make water penetration impossible.

Algaecides like Simazine work by penetrating the organism and destroying the food producing (photosynthesis) cells. Simazine is a long lasting chemical and the frequent use of this substance is not recommended. Simazine will affect plants in the same way as it affects algae.

Vermicompostis the product of the composting process using various species ofearthworms, to create a mixture of decomposing vegetable or food waste, bedding materials, and vermicast. Vermicompost contains water-soluble nutrients and is an excellent, nutrient-rich organic fertilizer and soil conditioner It is used in farming and small scale sustainable, organic farming. Vermicomposting has gained popularity in both industrial and domestic settings because, as compared with conventional composting, it provides a way to treat organic wastes more quickly. It also generates products that have lower salinity levels that are therefore more beneficial to plant

The study focuses on the effect of vermicompost on algal growth in plants.

METHODOLOGY:

Effect of vermicompost on Algal growth

Nine pots were taken and different herbs namely *Menthalongifolia,Coriandrumsativum* and *Hibiscus cannabinus* were planted in them . Out of the nine pots three were treated with algaecides commonly available in the market, three were treated with vermicompost and three were left untreated to grow naturally.The plants were allowed to grow for a period of three months and the results for the formation of algae were observed.

RESULTS:

EFFECT OF ALGAECIDE AND VERMIVOMPOST ON ALGAL GROWTH.

Name of the Plant	Effect of Algaecide		Effect of Vermicompost		Naturally growing plant	
Menthalongifolia	On plant	On algae	On plant	On Algae	On Plant	On Algae
	Reduced growth of plant almost nil	No formation of algae seen	Plant grew with strong stem and roots	No formation of algae seen	Growth was less	Green coloured algae were found all over the top of the soil
Coriandrumsativum	Reduced growth	No formation of algae seen	Growth was good	No formation of algae seen	Growth was less	Green coloured algae were found all over the top of the soil
Hibiscus cannabinus	Stunted growth of plant	No formation of algae seen	Plant grew tremendously with much stronger root and shoot	No formation of algae seen	Growth of plant tremendously reduced.	Green coloured algae were found all over the top of the soil

DISCUSSION:

Plants are prone to algal infections when more amount of moisture or less sunlight is provided. The most common method to remove the algae from the pots is to sanitize the pots by removing the plants washing the pots and then treating them with chemicals.Thisis a tiresome work and takes a lot of time. The other method is to spray the algaecides a mix them with the soil which is again a process harmful to plants.

In the present study, the focus was on a product which is more environmental friendly and easy to use without any harmful effect to the plant.As Vermicompost contains water-soluble nutrients and is an excellent, nutrient-rich organic fertilizer and soil conditioner it was used in the experiment to know its effect on algal growth as well.

The plants grown with vermicompost showed much better results in the form of increased plant growth and no algal formation.The plants grown with algaecides showed no signs of algae but the plant growth was stunted. The plants which were left untreated showed very less growth of plant and increased growth of algae on the top of the soil.

CONCLUSION.:

Thus the use of Vermicompost for algal growth for plants is a much better and safer options than the other alternatives.

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EFFECT OF VERMICOMPOST ON THE GROWTH RATE OF COMMONLY GROWN HERBS

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ABSTRACT: With the increase in population,there has been tremendous demand for food.In order to meet this demand, the cultivation of food cropsis done using more and more pesticides.The rampant use of pesticides has lead to loss of fertility in soil,release of green house gases and in long term effect the animals and human beings.Vermicompost is a complete organic manure which is not only beneficial in the long run but also retains the soil fertility without causing any harm to us.The present paper aims at studying the effect of vermicompost in comparision to pesticides on the common herbs.The research involves common herbs so that even a common man can use vermicompost in the kitchen garden.The plants grown by vermicompost were found to be more taller,stronger with high growth rate when compared to the plants treated with pesticides.

KEYWORDS:earthworms,fertilizer,soil,water,vermicompost,growth

INTRODUCTION:

Earthworms have been on the Earth for over 20 million years. They have faithfully done their part to keep the cycle of life continuously moving. They are nature's way of recycling organic nutrients from dead tissues back to living organisms. Ancient civilizations, including Greece and Egypt valued the role earthworms played in soil. The earthworm is a natural resource of fertility and life.

Earthworms live in the soil and feed on decaying organic material. After digestion, the undigested material moves through the alimentary canal of the earthworm, a thin layer of oil is deposited on the castings. This layer erodes over a period of 2 months. So although the plant nutrients are immediately available, they are slowly released to last longer. The process in the alimentary canal of the earthworm transforms organic waste to natural fertilizer. The chemical changes that organic wastes undergo include deodorizing and neutralizing. This means that the pH of the castings is 7 (neutral) and the castings are odourless. The worm castings also contain bacteria, so the process is continued in the soil, and microbiological activity is promoted.

Vermicomposting is a process by which organic waste is converted to bio fertilizer using earthworms. Vermicompost contains major and minor nutrients along with growth hormones, antibiotics and vitamins which are beneficial for the growth of crops, flowers and fruits settling and resistance to pest and diseases. Compost also contains calcium and humus which improves soil structure and moisture holding capacity

It is the process of turning organic debris into worm castings. The worm castings are very important to the fertility of the soil. The castings contain high amounts of nitrogen, potassium, phosphorus, calcium, and magnesium. Castings contain: 5 times the available nitrogen, 7 times the Vermiconversion available potash, and 1 ½ times more calcium than found in good topsoil. Earthworm castings have excellent aeration, porosity, structure, drainage, and moisture-holding capacity. The content of the earthworm castings, along with the natural tillage by the worms burrowing action, enhances the permeability of water in the soil. Worm castings can hold close to nine times their weight in water

VERMICOMPOST VS CHEMICAL FERTILIZERS:

The most important aspect of compost produced by earthworms is that it is 100% organic. There are no harmful chemicals and it does not need to be mixed with anything. Vermicomposting produces a product that is naturally designed to benefit plants in several different ways. The most significant benefit is that the nutrients in earthworm compost are very easily absorbed by the roots of plants. Unlike chemical fertilizers, vermicompost is not easily flushed from the soil because of the worm mucus that it contains. Plants have longer to obtain the nutrients and get the maximum benefit. As the compost is passing through the body of the worms it is enriched with bacteria and microbes. These help plants to become more disease resistant and also repel some plant pests. The presence of increased microbial activity can make the area much more attractive to birds which also help to remove plant pests. Among the hormones that earthworm compost contains are hormones that help plants to grow. Germination of seeds is encouraged, the growth of the plant is stronger and the crop yield improved. This natural support for the plants is not available with chemical fertilizers. The distribution of the compost through the soil also helps to encourage healthy root growth. Vermicompost is a colloid and holds up to nine times its own weight in water. This can make a huge difference when there is a dry spell. The water is held at an organic level so tends to evaporate slowly while still being available to the plants. Chemical fertilizers bombard plants with huge amounts of nutrients that are going to drain by and eventually be washed out of the soil by the rain.This is avoided by using compost which is lower in nutrient content but which does not get washed out of the soil. The nutrients are held in place and released slowly so that the plants receive what they need over a prolonged period.

The Chemical Fertilizers which are very rampant in use have many disadvantages.Theyare primarily made from nonrenewable sources, including fossil fuels.They grow plants but do nothing to sustain the soil. The fillers do not promote life or soil health, and even packages labeled "complete" do not include the decaying matter necessary to improve soil structure. In fact,

chemical fertilizers don't replace many trace elements that are gradually depleted by repeated crop plantings, resulting in long-term damage to the soil.Because the nutrients are readily available, there is a danger of over fertilization. This not only can kill plants but upset the entire ecosystem.Chemical fertilizers tend to leach, or filter away from the plants, requiring additional applications.Repeated applications may result in a toxic buildup of chemicals such as arsenic, cadmium, and uranium in the soil. These toxic chemicals can eventually make their way into your fruits and vegetables.Long-term use of chemical fertilizer can change the soil pH, upset beneficial microbial ecosystems, increase pests, and even contribute to the release of greenhouse gases.

OBJECTIVES:

- To minimize the organic waste in the campus.
- To prevent environmental pollution.
- To improve the quality of soil.
- To enhance germination, growth and yield.
- To make the plants healthy, resistant to diseases.
- To produce higher quality crops and better yield than chemical fertilizer
- To improve root growth and structure
- To enriche soil with micro-organisms (adding plant hormones such as auxins and gibberellic acid)

METHODOLOGY:

Nine Pots were taken and **three herbs** were planted namely:
Hibiscus cannabinus
Menthalongifolia
Portulacaoleracea

The three plants of different species were treated with **vermicompost**, three with **pesticide super phosphate**, three remaining were left **without treatment**.

The plants were allowed to grow for a period of **4 months**

OBSERVATION:

Name of the plant	Characters	Vermicompost	Pesticide Super phosphate	Naturally grown
Hibiscuscannabinus 	Length of the herb	32 cm	15 cm	14 cm
	Width of the stem	1 cm	0.4 cm	0.3 cm
	Width of the petiole	0.2 cm	0.1 cm	0.1 cm
	Leaf quality	Big	Small	Small and effected by pests
Portulaca oleracea 	Length of the herb	20 cm	12cm	8 cm
	Width of the stem	1.5 cm	1 cm	0.8 cm
	Width of the petiole	0.6 cm	0.3cm	0.1cm
	Leaf quality	Broad	Small	Tiny
Mentha Longifolia 	Length of the herb	20 cm	10 cm	7 cm
	Width of the stem	0.5 cm	0.3 cm	0.2 cm
	Width of the petiole	0.2 cm	0.1 cm	0.07 cm
	Leaf quality	Broad	Small	Tiny and effected by pests

VERMICOMPOST PLANTATION

Hibiscus cannabinus

Menthalongifolia

Portulacaoleracea

PESTICIDE PLANTATION

Hibiscus cannabinus

Menthalongifolia

Portulaca oleracea4

NATURAL PLANTATION:

Hibiscus cannabinus

Menthalongifolia

Portulacaoleracea

RESULT:

The use of vermicompost for growth of plants was found to be much better and safer option than pesticides.The plants which were grown using vermicompost showed a good growth and were found to be healthy and resistane to disease than when compared to the plants grown with pesticide.

CONCLUSION:

Using earthworms creates a product that is natural. The cycle of regularly over-dosing the soil is broken. Plant health is promoted by long term exposure to nutrients and the soil condition will continue to improve.Vermicompost is a renewable and environmentally friendly resource. A totally natural product, vermicompost can help reduce the need to apply chemical fertilizers Vermicompost may also contain plant growth regulators that improve plant growth. The nutrients in vermicompost can help plants grow more vigorously; produce bigger blooms and both increase and improve the quality of crop yields.

GROWTH AND SURVIVAL OF FINGERLINGS OF MOLLY WITH DIFFERENT DIETS

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***Abstract*: The efficacy of fingerlings of Molly, Poecilia sphenops to four types of formulated feeds containing different proportions of animal protein (fish & prawn meal, Bloodworm meal and Homemade protein feed) was evaluated in comparison with a commercially available pellet feed. Diet I was prepared in combination with fish meal and prawn meal, Diet II was prepared in combination with Blood worm meal. Diet III was prepared only with homemade protein feed respectively. In 25 days feeding experiment, length gain and healthy growth of fries observed, the development of P.sphenops suggest all the diets supported normal growth, nevertheless variation in the growth performance with different diets might be due to the difference in the composition of the macronutrient of these diets.**

***Keywords*: Fingerling, Molly, Protein, Pellet, Diet**

Introduction:

The Molly fish is known as a Livebearer and they are omnivores. Even though you will see these fish eating algae constantly in the fish aquarium, they actually love other foods too. Basic tropical flakes are going to be the core to your Mollies diet but adding an alternative "treat" is a great idea to make your fish more healthy and happy. The feed requirements of fish vary in quantity and quality according to their feeding habits and digestive anatomy as well as their size and reproductive state. Feed requirements are also affected by environmental variations such as temperature and the amount and type of natural food available (Gonzalez and Allan, 2007). It is important to highlight that the food intake in fish is closely related to its energy requirements, e.g. a decrease in feeding was observed in Cichla sp. at higher digestible energy (DE):brute protein (BP) ratios due to the fact that high dietary energy induce satiety (Sampaio et al., 2000).

The success in the development of fries and fingerlings is largely dependent on the availability of suitable live food organisms. The present study evaluates the growth and survival of fries and fingerlings of P. sphenops using live feed and pelletized feed

Materials and methods: One of the most popular Aquarium Fish viz., Molly (Poecilia latipinna) was utilized in the present experiment.

Experiments were conducted to study growth and survival of fingerlings of P. sphenops using formulated & homemade food diets. Two batches of fingerlings having 8 numbers in each glass tank were provided with 3 different types of feed. Two different types of formulated feeds were prepared using different proportions of fish meal, prawn meal and bloodworm meal.

Length , weight and survival of fingerlings from all the tanks were measured and recorded in the beginning of experiment, followed by once in seven days and then at the end of the experiment. The length gain, weight gain, survival rate, mortality rate was calculated following standard procedure.

Length gain (mm) = Final length – initial length Weight gain (g) = Final live weight – initial live weight

$$\text{Growth rate} = \frac{\text{final no.of.fishes}}{\text{Initial no.of fishes}} \times 100$$

RESULTS:

The results pertaining to the feeding trials of the wisps of Poecilia sphenops show that the fries that were fed with diet 3 had gained extreme length, more weight compared to other fingerlings(of different diet) and the survival rate was higher than others.

When the young fishes were fed with control pellet food followed by diet 2 and diet 3 one at a time, the growth of the fishes lengthwise and the weight gain was similar. Similarly, when the fishes were fed with control feed and then with diet 3, the length and weight gain was maximum.

The survival rate of the fishes when fed with diet 2 was almost identical to when they were fed with diet 3. Whereas there was a low survivality in case of the fishes fed with diet 1.

The mortality rate was seen to be higher in the fishes fed with diet 1, while it was minimum in case of the fishes feeding on diet 3.

MOLLIES	DIET 1 (FISH MEAL AND PRAWN MEAL)	DIET 2 (BLOOD WORM MEAL)	DIET 3 (HOMEMADE PROTEIN FEED)
LENGTH	NORMAL	NORMAL	MAXIMUM
WEIGHT GAIN	NORMAL	NORMAL	MAXIMUM
SPECIFIC GROWTH RATE	NORMAL	NORMAL	MAXIMUM
SURVIVAL RATE	LOW	NORMAL	NORMAL
MORTALITY RATE	HIGHEST	NORMAL	LOW

Table showing the growth and survival pattern of Molly fish fries

Fig. Showing fries of Molly fish

Discussion:

Fish meal is known for its high essential Amino acid a Fatty acids contents, high digestibility, low Carbohydrates, etc., Lipid is known to be one of the important nutrient next to protein, which plays a major role in optimum utilization of dietary Protein for growth. Lipids are almost completely digestible by fish and seem to be favoured over Carbohydrates as an energy source. Fishes are also known for utilizing protein preferentially over lipid or Carbohydrate as an energy source. Therefore, it is important from nutritional, environmental and economic point of view to improve protein utilization for tissue synthesis, rather than energy purposes.

Fish requires two to four times more dietary protein compared to warm-blooded animals, due to relatively higher need of essential amino acids in fish. Further, there exists a difference in optimum level of protein requirement between carnivorous and omnivorous fishes.

When mollies were fed with commercial pellet feed the mortality rate of fishes was the highest and the survival rate of fishes was less compared to the animal protein feed diet.

Conclusion:

The experiment proved that the commercial pellet diet of fishes shows high mortality and less survival rate andthe fishes fed with protein diet like soft insides of cucumber,egg yolkand spinache improvises in a healthy growth of fingerlings. Also thefishes fedwith blood worm meal diet showsa constantgrowth of fries and goods urvival rate.

In view of higher cost and mortality rate of imported commercial pellet feed compared to experimental diets. Experimental diets formulated with locally available and homemade animal protein sources could be used in commercial production of molly fishes.

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QUALITATIVE ANALYSIS OF PURE AND MARKET GHEE SAMPLES

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ABSTRACT: Ghee is the clarified butter obtained from the milk of buffaloes; cows, goats and sheeps. It is prepared by melting the butter, boiling off the moisture and decanting the clarified fat. Consumers love its distinct flavor. In order to ensure a genuine product to the consumer, the Government of India has prescribed the compositional standards for ghee, under PFA act and Agmark rules. But, unfortunately, the producers or the middle-men involved in the ghee trade, inn their greed to have more money, tend to adulterate ghee with cheaper oils and fats like vegetable oils, animal body fats, hydrogenated fats, and sometimes even the non edible mineral oils, especially during lean season. The most intricate problem facing the ghee industry today is its widespread adulteration, especially with hydrogenated and refined vegetable oils. This has adversely affected both the consumer and the producer.

Introduction:

It is known in different countries with different names such as 'maslee' or 'samn' or 'samna' in Egypt and Israel, 'Roghan' in Iran, and 'Dahinhurr' in Iraq. Butter oil, popular in western countries, is slightly different from ghee as the former has bland flavor. The origin of ghee making lies far beyond recorded history. The word ghee itself stems from old Sanskrit word 'ghrit' which means bright or to make bright. When sprinkled on fire, butter fat enhances its

Brightness.

India's ghee trade is as old as agriculture. Owing to the distribution of 95 per cent of total population of animals in villages, maintained by small producers, generally in herds of 2 or 3 animals ghee industry assumes a special importance as a cottage industry. In rural areas, remote from the cities and towns where facilities for sale or fluid milk are wanting the cultivators have to convert surplus milk into ghee as it is the only rational method of preserving milk fat without deterioration for fairly long periods.

Ghee has a high smoke point (250 °C or 482 °F). It can cook and fry with ghee and it will not break down into free radicals like many other oils. Ghee is rich in butyric acid which is great for healing the gut. Research shows that adequate production of butyric acid supports the production of killer T cells in the gut, and thus a strong immune system.

Solidifying Nature:

Solidifying point is defined as the temperature at which fat shows first sign of appearance of solid phase on cooling. Solidification temperature of milk fat depends very much on the procedure employed for cooling (Webb *etal.*, 1987). Rahn and Sharp (1928) reported solidification point of 19.7 and 23.6°C for samples of the same milk fat cooled by immersion at 14 and 20°C,respectively

Much like coconut oil, ghee is rich in medium chain fatty acids which are absorbed directly to the liver (like carbs) and burned as energy. Athletes can use ghee as a consistent energy source. The energy from these medium chain fatty acids can be used to burn other fats in the system and lose weight. Ghee nourishes the brain, helps inflammation and feeds our immune system. Ayurvedic physicians have used oral butyrate supplements and butyrate enemas to treat inflammatory bowel diseases such as Crohn's and ulcerative colitis for centuries. Ghee is made from butter but the milk solids and impurities have been removed so most people who are lactose or casein intolerant have no issue with ghee.

Materials Required:

Materials used for the above experiment include various types of ghee samples available in the market labelled for convenience sample A,B,C,D,E and F

Equipment:Test tubes, Watch glasses, Glass rods and others include → (cotton plugs used in place of stoppers for test tubes),Spatula & Spirit lamp

Chemical s: Conc HCl , Diethyl Ether, Iodine solution

Methodology: The Samples (about 5ml)each should be taken separately in separate test tubes labelled A,B,C,D,E & F then the ghee samples are melted using spirit lamp. About 5ml of Conc HCl is added to each of the samples & about 0.1% to all the test tubes and observed for a colour change after 10-15mins.

Fig a: Test for adulteration with vegetable oil

Fig b: Test for adulteration with sweet potato/starches

Fig c: Test for adulteration with old/rancid ghee

Fig d: Conducting Tests for adulteration

TABLE: A

S.no	Testing for adulteration with vegetable oil	Observation	Inference
1.	Sample- A (Market ghee sample)	Red color was observed	Sample was adulterated with vegetable oil
2.	sample -B (Market ghee sample)	Reddish brown color was observed	Sample was adulterated with vegetable oil
3.	sample -C (Market ghee sample)	Red ppt was settled at the bottom	Sample was adulterated with vegetable oil
4.	Sample- D (Market- Vanaspati ghee sample)	Pale red color was observed	Sample was adulterated with vegetable oil
5.	sample- E (cow ghee/ market)	No color change was observed	No adulteration
6.	Sample- F (pure ghee/ home made)	No color change was observed	No adulteration

TABLE: B

S.no	**Testing for adulteration with sweet potato /other starches**	**Observation**	**Inference**
1.	Sample- A (Market ghee sample)	purple color was seen	Sample was adulterated with starch
2.	sample -B (Market ghee sample)	Solution turned pale purple	Sample was adulterated with starch
3.	sample -C (Market ghee sample)	purple color was seen	Sample was adulterated with starch
4.	sample -D (Market- Vanaspati ghee sample)	purple color was seen	Sample was adulterated with starch
5.	Sample-E (cow ghee/ market)	Slight color change was observed	slight adulteration
6.	sample -F (pure ghee/ home made)	No color change was observed	No adulteration

TABLE: C

S.no	Testing for adulteration with old / rancid ghee	Observation	Inference
1.	sample -A (Market ghee sample)	Pale pink colour was observed	Sample was adulterated with old /rancid ghee
2.	sample -B (Market ghee sample)	No colour change was observed	Sample was not adulterated with old / rancid ghee
3.	sample -C (Market ghee sample)	No colour change was observed	Sample was not adulterated with old / rancid ghee
4.	sample -D (Market- Vanaspati ghee sample)	Pale pink colour was observed	Sample was adulterated with old / rancid ghee
5.	Sample -E (cow ghee/ market)	No colour change was observed	Sample was not adulterated with old / rancid ghee
6.	sample -F (pure ghee/ home made)	No colour change was observed	Sample was not adulterated with old / rancid ghee

Results and discussions:

From the above tables it is revealed that samples A,B,C,D are adulterated either with vegetable oil or starch or old/rancid ghee while the sample E (cow ghee/ market) is slightly adulterated with vegetable oil and starch and sample f(pure ghee/ homemade) has shown negative results for all the three successive tests.

Conclusion:

It is thus concluded that homemade pure buffalo ghee and cow ghee samples are proved to be the best samples without any adulteration.

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Removal of Turbidity from Waste Water by Adsorption Technology using natural adsorbent - Lotus Flower powder *(Nelumbo nucifera)*

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Abstract

Water is a universally available, most commonly used and vital compound found on earth. Its unique property of acting as a universal solvent makes it the most widely used chemical in all spheres of life. Due to multi-utility, the level of purity is deteriorating day by day and has reached to such an alarming extent that immediate measures are required for its purification.

Numerous methods are available in this regard but most of them are expensive and require artificially synthesized chemicals which add more pollutants back into the atmosphere. The best method utilizes naturally available substances for the removal of impurities from turbid waste water.

Batch adsorption experiments were carried out to determine the effect of optimum dosage level, effective concentration, stirring time, temperature and PH on the turbidity removal. Data obtained were used to calculate percentage removal and adsorption parameters by Lotus flower powder.

Keywords: *Water, Turbidity, Nelumbo, Nephelometer, Optimum Dosage, Effective concentration, Optimum Contact time, temperature, pH, percentage removal.*

Introduction

Safe drinking water is essential to humans and other life forms .Access to safe drinking water has improved over the last decades in almost every part of the world, but approximately one billion people still lack access to safe water and over 2.5 billion lack of access to adequate sanitation. However, some observers have estimated that by 2025 more than half of the world population will be facing water-based vulnerability. A report, issued in November 2009, suggests that by 2030, in some developing regions of the world, water demand will exceed supply by 50%. Water plays an important role in the world economy. Approximately 70% of the freshwater used by humans goes to agriculture.

There are many physical (Osmosis, diffusion etc) and chemical (TiO2 treatment, nano-particles) means employed for the purification and treatment of waste water, but all the above means are either costly or they produces slurry which is contributed back to the environment as a pollutant.

Hence there is a need to adopt relatively cheap, cost effective, and natural means for the treatment of waste water by which water pollution as well as environment pollution will reduce simultaneously.

The history of use of natural coagulants is long. Natural organic polymers have been used for more than 2000 years in India, Africa, and China as effective coagulants which aids at high water turbidities. These may be manufactured from plant seeds, leaves, and roots. These natural organic polymers are interesting because, comparative to the use of synthetic organic polymers containing acrylamide monomers, there is no human health danger and the cost of these natural coagulants would be less expensive than the conventional chemicals alike since it is locally available in most rural communities of Bangladesh. A number of effective coagulants from plant origin have been identified: *Nirmali*, *Okra*, red bean, sugar and red maize, *Moringa oleifera*, *Cactus latifera*, and seed powder of *Prosopis juliflora*. Natural coagulants have bright future and are concerned by many researchers because of their abundant source, low price, environment friendly, multifunction, and biodegradable nature in water purification.

There have been various natural sources used in this regard like cumin, banana peel etc. The best method utilizes naturally available substances for the removal of impurities from turbid waste water. Lotus flower powder is an effective adsorbent which can be used for removal of turbidity to a large extent.

Nelumbo nucifera, also known as Indian lotus, sacred lotus, bean of India, Egyptian bean or simply lotus, is one of two extant species of aquatic plant in the family Nelumbonaceae, commonly cultivated in water gardens. It is also the national flower of India, and Vietnam. India is a land of festivals where lotus flower are traditionally used for religious ceremonies & floral ornamentations and are discarded all over.

It has a lot of medicinal value from time immemorial. In Ayurveda this plant is used as a diuretic and anthelmintic and in the treatment of strangury, vomiting, leprosy, skin diseases and nervous exhaustion. In popular medicine it is used in the treatment of tissue inflammation, cancer, skin diseases, leprosy and as a poison antidote.

Fig 1. (a)Nelumbo nucifera (Lotus) Flower **(b) Nelumbo nucifera (Lotus) Fruit**

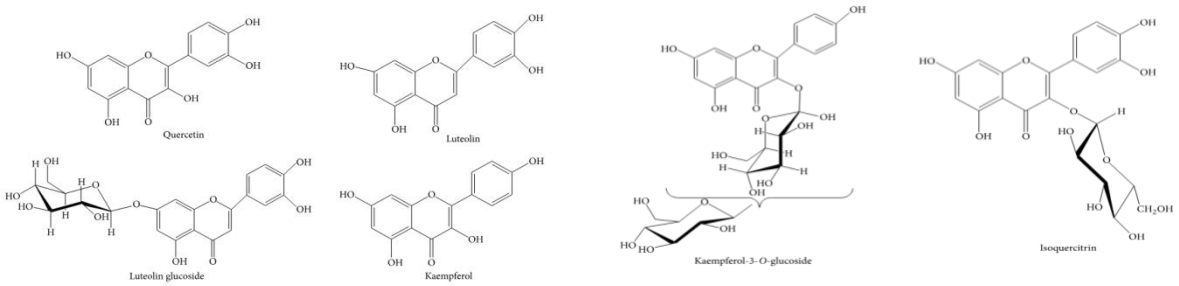

Fig 2 Major Chemical constituents found in Nelumbo nucifera Flower

The phytochemicals reported in flower of Nelumbo nucifera are Quercetin, Luteolin, Luteolin glucoside, Kaempferol-3-glucoside, Isoquercitrin (Fig.3).

The purpose of this study is to investigate and design a novel and cost effective natural method to reduce turbidity in water by using lotus flower powder as a natural adsorbant by adsorption technique.

Materials and Method

A. Material

1. Selection of Adsorbent:

The experiments were carried out using the natural adsorbent lotus flower. The adsorbent samples were collected from the nearby locality and washed several times with distilled water to remove dust and other impurities. After drying it was grinded using domestic mixer and sieved to 250 mesh size. The sample was washed with distilled water to remove color and dried in an oven at 80^{o}C for 24 hours. The dried samples were roughly grinded and stored in airtight bottles for further use without any chemical or physical treatment.

Fig 3. Lotus Flower Powder

2. Preparation of Synthetic Turbid Solution:

Benthonite is a natural coagulant which contains essential components like aluminium, iron, clay etc. It is a highly colloidal clay and forms a clay suspension by coagulation under easy conditions. Moreover it is economically available and thus can be easily used as a natural coagulant for preparing synthetic turbid solution.
Benthonite solution was prepared from analytical grade Benthonite Powder (SDFCL). Turbid water was synthetically prepared by adding bentonite powder in 1 liter of distilled water. The resulting bentonite solution was suspended for 1-2 days after vigorous shaking followed by slow mixing to obtain uniform dispersion of Bentonite particles. Stock solution of 100 NTU was prepared. The working solutions were prepared from the stock solutions by diluting it to appropriate volumes to get the desired solutions of effective concentrations.

B. Experimental Procedure:

The influence of parameters such as concentration, dosage, shaking time, pH, and temperature on turbidity of solution has been considered by means of batch adsorption experiments. The %Removal is calculated by using the following formula:

$$\% \text{ Removal} = \frac{Initial\ Concentration - Final\ Concentration}{Initial\ Concentration}\ X\ 100$$

1. **Effect of Dosage**

A given initial concentration of the adsorbate under the operating conditions biosorbent dose is an important parameter influencing the biosorption process. Therefore, the effect of biosorbent dose on biosorption was investigated in order to determine the biosorption capacity of biosorbent,

Benthonite Stock solution (100NTU) is taken in 6 different conical flasks and is mixed with Lotus flower powder with varying dosage values of each containing 0.1gm,0.2gm, 0.3gm, 0.4gm, 0.5gm and 0.6gm respectively. The conical flasks are subjected to uniform shaking for few minutes and then allowed to settle but not filtered. After some time the turbidity of each set is observed and % Removal is calculated. The optimum dosage value is determined by plotting a graph between %Removal of turbidity on y- axis and dosage on X-axis.(Fig. 4). Steep rise in curve indicated optimum dosage.

2. **Effect of Concentration**

The optimum dosage (0.2gm) which is effective for 70% turbidity removal is now considered to determine another parameter i.e. concentration.

From the stock solution, 10 sets of 10NTU, 20NTU, 30NTU, 40NTU, 50NTU, 60NTU, 70NTU, 80 NTU, 90NTU and 100NTU each, turbid solutions were prepared by diluting the stock solution taken in appropriate quantities to get the desired solutions of effective concentrations. Optimum dosage of 0.2gm is added to each set of conical flask and is subjected to uniform shaking for few minutes. It is then allowed to settle for few minutes but not filtered. Turbidity of each set is observed and % Removal is calculated. The optimum stirring time value is determined by plotting a graph between %Removal of turbidity on y-axis and Concentration on X-axis. (Fig.5). Steep rise in curve indicated Optimum Concentration.

3. **Effect of Contact Time**

In order to establish the equilibration time for maximum uptake effect of Lotus flower powder shaking time is observed. In this parameter, the conical flask containing solutions of bentonite (80NTU) and Lotus flower powder(0.2gm) are subjected to different stirring times(5min, 10min, 15min, 20min and 25min respectively) and the percentage removal of turbidity of the solutions is measured and %Removal is calculated. The optimum stirring time value is determined by plotting a graph between %Removal of turbidity on y- axis and stirring time on X-axis.(Fig 6). Steep rise in curve indicated optimum Contact Time.

4. **Effect of pH**

Solution pH is an important monitoring parameter influencing the adsorption behavior of adsorbate onto biosorbent surface because to its impact on both the surface binding-sites of the biosorbent and the turbid solution. In the present study, the effect of pH on biosorption onto Lotus flower powder was studied in a range of 3–9. 7 sets of solutions having same optimum concentration (80NTU), optimum dosage (0.20 gms) but different PH range varying from 3 to 9 was prepared and the percentage removal of turbidity of the solutions is measured for an optimum shaking time of 20 min. Turbidity of each set is observed and %Removal is calculated. The optimum pH value is determined by plotting a graph between %Removal of turbidity on y- axis and pH on X-axis(Fig.7). Steep rise in curve indicated optimum pH.

5. Effect of Temperature

The temperature was varied for the solution with optimum dosage, optimum concentration, optimum contact time and optimum pH. Concentration and it has been found that high and low temperature conditions has negligible effect on the removal of turbidity. Whereas the solution at 15°C is found to show effective removal of turbidity (100% removal), the temperature is considered as an optimum temperature (Fig.8).

Results and Discussion:

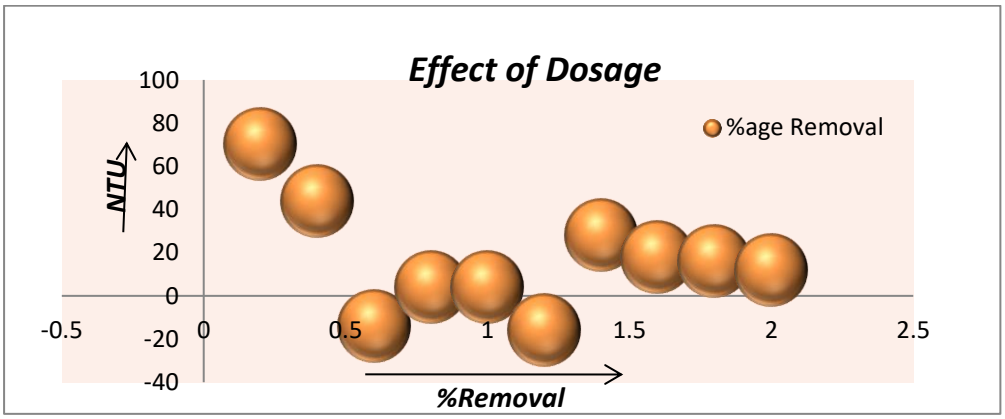

Figure 4 Effect of Dosage Removal of Turbidity by Lotus Flower Powder

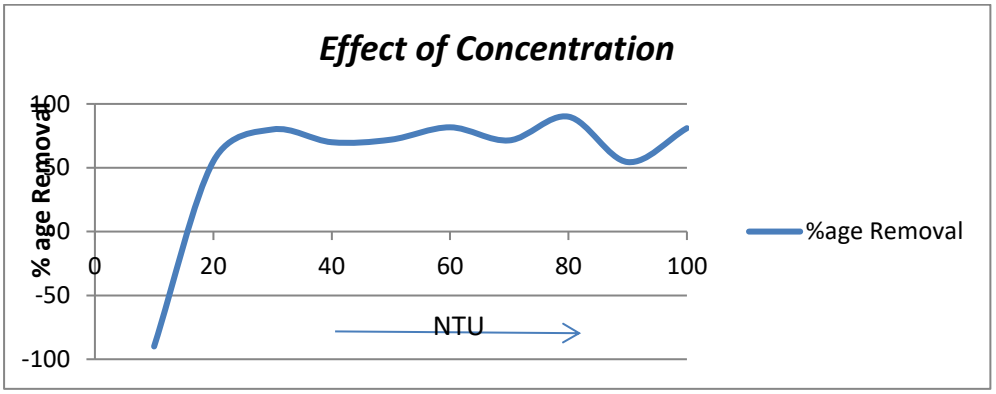

Figure 5 Effect of Concentration Removal of Turbidity by Lotus Flower Powder

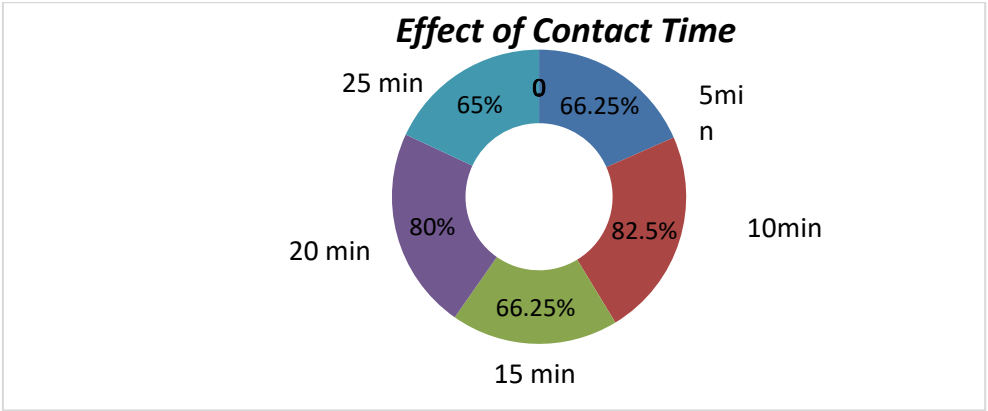

Figure 6 Effect of Contact Time Removal of Turbidity by Lotus Flower Powder

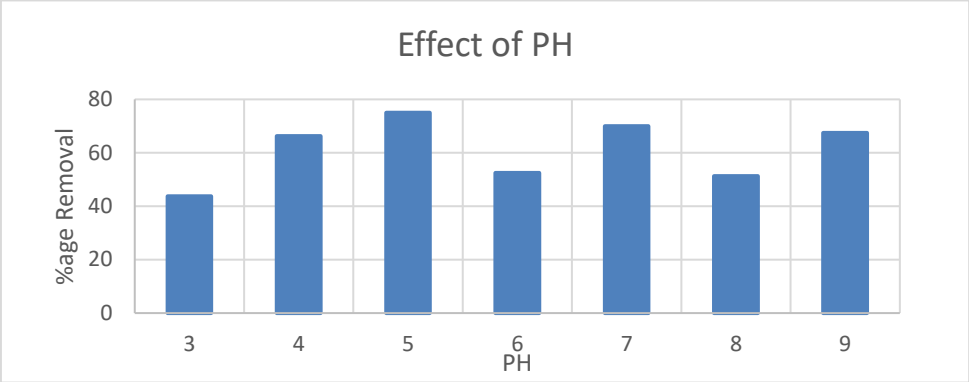

Figure 7 Effect of pH Removal of Turbidity by Lotus Flower Powder

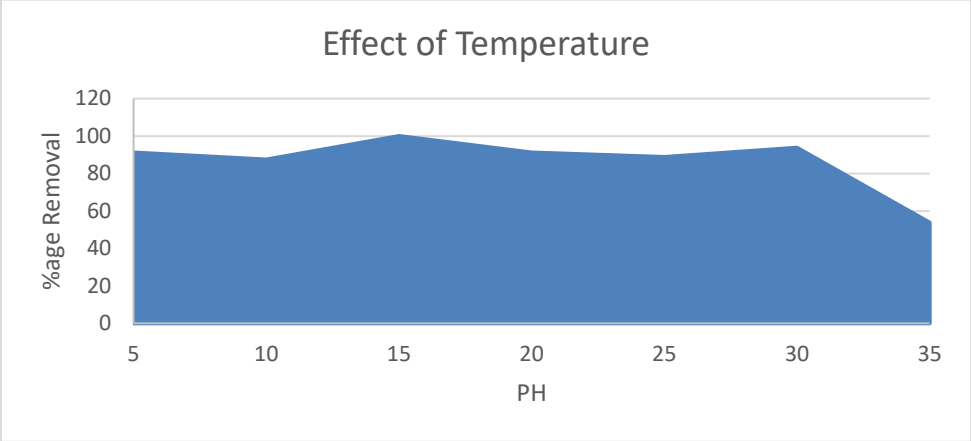

Figure 8 Effect of Temperature Removal of Turbidity by Lotus Flower Powder

The obtained results reveal that the low-cost adsorbent (Lotus flower powder) can be used for the removal of turbidity from waste water solution. The adsorption capacity of Lotus flower powder for removal of turbidity was found to dependent on dosage, concentration, contact time and pH.

The effect of biosorbent(Lotus Powder) dose on biosorption was investigated in order to determine the biosorption capacity of biosorbent, and it was found that at an effective concentration of 80 NTU benthonite solution, lotus powder was highly effective in removal of turbidity at an optimum dosage of 0.20gms. Further maximum percentage removal of turbidity of 82.5% is seen at 10 minutes of stirring.

Conclusion

We report a novel cost effective, natural and green route to remove the level of turbidity in water. This study was initiated to study the removal of turbidity of water using Lotus flower powder by adsorption technique. The effect of adsorbent dosage, concentration, pH and stirring time and temperature were investigated.

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Clues to the Past-"Living Fossils"

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Abstract:

Living fossils are members of taxa that exhibit notable longevity in the sense that they have remained recognisable in the fossil record over unusually long periods. Living fossils commonly are species for lineages, but they need not be. The fossils exhibit stasis over geological long time scales. Ancient remains are generally fragmentary and can be studied only in a limited number of ways, but some discoveries are of sufficiently great antiquity to bridge the gaps separately between major kinds of mammalian anatomy and geometry of phylogeny.

Keywords:

Horseshoe crab, limulus , nautilus , coelacanth, living fossils ,lineages, geological time scale.

Commented [p1]:

INTRODUCTION:

A **fossil** (from Classical Latin *fossils*; literally, "obtained by digging") is any preserved remains, impression, or trace of any once-living thing from a past geological age. Examples include bones, shells, exoskeletons, stone imprints of animals or microbes, hair, petrified wood, oil, coal, and DNAremnants.

Commented [p2]:

Here comes what exactly living fossils mean-A **living fossil** is an extant taxon that closely resembles organisms otherwise known only from the fossil record. As a rule, to be considered a living fossil, the fossil species must be old relative to the time of origin of the extant clade. Living fossils commonly are species-poor lineages, but they need not be. The term *living fossil* is not formally defined, but in scientific literature the term usually connotes a bradytelic group. "Bradytelic", however, is rarely used in modern scientific literature but the characteristic of a bradytelic group is that its changes fluctuate on a small scale and do not accumulate over time. In modern literature, the term most often used for that distinctive evolutionary tempo is "stasis". Living fossils exhibit stasis over geologically long time scales

Examples of living animal fossils*-Monito del Monte, Horseshoe crab, Velvet worm, Nautilus, Coelacanth, Hoatzin.*

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How can we distinguish living fossils???*Are they any methods! Let's study the following statements.*

The first two are required for recognition as a living fossil stasis but some authors include the third.

1. They are members of taxa that exhibit notable longevity in the sense that they have remained recognisable in the fossil record over unusually long periods;
2. Show little morphological divergence, whether from early members of the lineage, or among extant species, and
3. Tend to have little taxonomic diversity.

History of living fossils:

The term was coined by Charles Darwin in his *On the Origin of Species* from 1859, when discussing *Ornithorhynchus* (the platypus) and *Lepidosiren*(the South American lungfish):

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All fresh-water basins, taken together, make a small area compared with that of the sea or of the land; and, consequently, the competition between fresh-water productions will have been less severe than elsewhere; new forms will have been more slowly formed, and old forms more slowly exterminated. And it is in fresh water that we find seven genera of Ganoid fishes, remnants of a once preponderant order: and in fresh water we find some of the most anomalous forms now known in the world, as the *Ornithorhynchus* and *Lepidosiren*, which, like fossils, connect to a certain extent orders now widely separated in the natural scale. These anomalous forms may almost be called living fossils; they have endured to the present day, from having inhabited a confined area, and from having thus been exposed to less severe competition.

What do "living fossils" mean to EVOLUTION?

A new article in *American Scientist*, "The Evolutionary Truth About Living Fossils," explores the subject, and notes that "The term living fossil has been used since Darwin coined it." It then attacks the use of living fossils by "creationists":

> *Unfortunately, creationists bent on denying the factual basis of evolution have increasingly misappropriated the term living fossil. In the Atlas of Creation, which pairs photographs of living fossils with similar ancient fossils, Turkish author and Islamic creationist Harun Yahya erroneously argues that "Darwinists are desperate when confronted by these fossils, for they prove that the evolution process has never existed." Entry of "living fossil" into Internet search engines yields a preponderance of creationist websites, despite the fact that these species neither disprove nor provide any evidence counter to our understanding of evolution, which remains the cornerstone of biological science. There are no "unevolved" species, no reanimated fossils that have literally come back to life, and no living organisms that are truly identical to extinct species known in the fossil record.*

Some of these counterpoints may be reasonable, and I certainly wouldn't endorse Harun Yahya's bizarre book. But the article in *American Scientist* misses the fact that whenever we see in the fossil record an organism that looks virtually identical to a living species, that's also completely consistent with the hypothesis that "this species has not evolved." So while it's correct to for the authors say "we must not expect that all aspects of coelacanth or horseshoe crab biology have existed unchanged for hundreds of millions of years," *it's equally if not more correct to respond that we must not assume that they have changed either* (aside from, perhaps, neutral mutations). After all, the hard evidence which we have suggests they haven't changed.

MONITO DEL MONTE.

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- *Oligocene(23)*
- *Mammal*
- *Central Chile*
- *Insects, invertebrates, fruits*
- *Nests made with bamboo sticks*
- *Hibernate*
- *Reproduce in spring.*

Regarded by scientists as a living fossil, the Monito del Monte (Dromiciops gliroides) or "mountain monkey", a small marsupial is the only surviving representative of the superorder Australidelphia. A nocturnal and arboreal mammal, it is widespread across Argentina and Chile inhabiting dense, cool, humid forests. Slightly larger than a mouse, it measures between 83-130mm (head to body) length, around 90-132 mm tall and weighs between 16-42 g.

It has dense, silky brown-colored fur, short and furry ears, round eyes mark by black rings and a hairy prehensile tail. An amazing and excellent tree climber, it feeds mainly on insects and other small invertebrates. The Monito del Monte has a life span of about 2 years. Its population decreasing due to habitat loss, this marsupial is Listed as Vulnerable on the 2006 IUCN Red List of Threatened Species.

HORSESHOE CRAB.

- *Ordovician (488-433)*
- *Arthropod*
- *Asia to America*
- *Omnivorous*
- *Tail to flip*
- *Shores for mating.*

American horseshoe crab is a common sight on Florida's beaches. Many people have seen horseshoe crabs but do not realize they are looking at one of the oldest animals on the planet. Often called "living

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fossils," horseshoe crab ancestors can traced back through the geologic record to around 445 million years ago, 200 million years before dinosaurs existed. Horseshoe crabs are actually not true crabs at all, being more closely related to arachnids (a group that includes spiders and scorpions) than to crustaceans (a group that includes true crabs, lobsters, and shrimp). Four species of horseshoe crabs exist today. Only one species, Limulus Polyphemus, is found in North America along the Atlantic and Gulf coasts from Maine to Mexico. The other three species are found in Southeast Asia.

HOATZIN.

- *No date. First feather birds.*
- *Birds*
- *Amazon and orinoco*
- *Leaves and fruits*
- *Stinkbird*
- *Claws*
- *Guyana.*

This unique family history makes for one hell of a unique bird. The South American, rainforest-dwelling Hoatzin is roughly the size and shape of a chicken, and it looks like the mascot for your sixteen-year-old's death metal garage band. Its long, dark wing and tail feathers give it a cloaked appearance, and make its body look massive in contrast to its relatively tiny head. Its face is featherless and the skin is brilliant blue, punctuated by dark red eyes. Sitting atop its cranium is an orange, spiky crest that would be the envy of any '90s goth or punk rocker.

The Hoatzin's weirdness doesn't stop with its looks though, and there's plenty more unique hiding under the surface. The Hoatzin doesn't eat seeds, or fruit, or insects, or meat like a normal bird. Instead it is intent on eating leaves, a diet that very few birds in the world can subsist on. Leaves are difficult to digest, especially when you can't chew them, so the Hoatzin employs a solution straight from the barnyard: it incubates the leaves in its enlarged cropand ferments them with the help of the microorganisms that live there. The Hoatzin is basically a cow, and it is reputed to smell like one too.

COELACANTH.

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- *Devonian (416-360)*
- *Fish*
- *Indian ocean*
- *Swallow water fish*
- *Caves at 100-150 metres*
- *Ovoviviparous.*

One of the few species to have hardly changed in tens of millions of years..

A deep-sea fish which became known as a “living fossil” has not changed in appearance since before the time of the dinosaurs with the help of an extraordinary genome that is barely evolving, a study has found.The coelacanth, which lives in deep-sea caves off the coast of Africa, was once known only from its fossils and so was thought to have gone extinct at least 70 million years ago until a recently-dead specimen was discovered by South African fishermen in 1938.It is one of the few species to have hardly changed in tens of millions of years and now scientists believe this physical stability is mirrored in the coelacanth’s genome – the 3 billion “letters” of its DNA code. “We found that the genes overall are evolving significantly slower than in every other fish and land vertebrate that we looked at. This is the first time that we’ve had a big enough gene set to really see that,” said Jessica Alfold, a research scientist at the Broad Institute of MIT and Harvard in Massachusetts.

NAUTILUS.

- *Triassic (225)*
- *Cephalopod*
- *Indo- pacific*
- *Fish, shrimps and crustaceans*
- *300 metres*
- *Withdraw*

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Amongst all underwater creatures, the curious-looking nautilus is the one creature that fascinates me the most. The Nautilus is known as the living fossil due to the fact that it has remained largely unchanged for almost 400 million years. Found in abundance in prehistoric times, the nautilus' numbers have dwindled and only a handful of its species remains today.

The nautilus which gets its name from the Greek word meaning 'sailor', is a mollusc and a member of the cephalopod family. It is closely related to other cephalopods such as the squid, cuttlefish, and octopus. And just like the other members of its family, the Nautilus too uses water jet expulsion to propel in quick bursts across the ocean. Part of the mystery shrouding the life and habits of this prehistoric creature is the fact that it usually inhabits depths of about 300 m, rising to around 100 m at night only for feeding, mating or laying eggs. It is known that the average lifespan of a nautilus is around 20 years, and it lays its eggs on rocks in shallower waters.

VELVET WORM.

- *Eocene(40)*
- *Panarthropod(ecdysozoa)*
- *Central America*
- *Invertebrates*
- *Sense of perception*
- *Secrete sticky substance.*

There is a phylum of living lobopods called *velvet worms*, caterpillar-like creatures that live in moist environments like soil and rotting tree trunks. They bear a striking resemblance to some of their oldest fossil

ancestors, suggesting that these early adaptations remain ecologically relevant. Velvet worms are thought to be a well-preserved descendant of a prototypical animal from which arthropods (including insects, spiders, and crustaceans) were derived, as they share many important body-plan characteristics. Velvet worms don't look like our ancestors, however. The difference between the lineage leading to humans and that leading to velvet worms diverged very early on in the Cambrian: humans have one kind of embryonic development shared with starfish and sea urchins, while velvet worms share their embryonic development with squid and 'bugs'.

DISCUSSION?

Why to study the importance of living fossils?

Fossils are the remains or impression of a prehistoric plant or animal embedded in rock and preserved in petrified form. In simple words, Fossils are basically degraded living things which responsible for reformation of earth's productive natural things. Fossils develop when dead animals and plants degrade and mix in soil and helps humus layer of soil (Top most layer of Soil formation) to be more fertile.

Now a days, Due to continuously developing human made technology leads to degradation of renewable or natural resources which increase the importance of study of fossils. In this way, study of fossils become important in this modern world.

Because humans become so obsessive about their comforts unknowingly he cut down our natural resources so this things increase the need of this kind of studies which help humans to understand how we can restore or prevent our natural resources so that it does not become curse for us.

SIGNIFICANCE OF EVOLUTION :

Darwin first drew attention to the idea of living fossils. At this time he was thinking of the Ginkgo tree. From his evolutionist point of view, he was at a loss to imagine how creatures which appeared long ago and therefore presumably have simple characteristics, could do well in communities where the other organisms enjoy the latest developments. It was a wonder to Darwin that archaic or old fashioned forms were not eliminated although they were apparently untouched during the passage of time. From an evolutionary perspective then, living fossils are viewed as organisms with a very long history. Creationists point out that this idea of long time intervals is open to question. Nevertheless, it is the idea that organisms are "very old" which arouses the interest of the public.

Darwin realized that living fossils are not what evolutionists expect to find in nature. Indeed to supporters of the evolution paradigm, the idea of living fossils, so ancient and unchanged, is definitely a problem. As Niles Eldredge remarked: "In the context of Darwin's own founding conceptions, and certainly from the perspective of the modern synthesis, living fossils are something of an enigma, if not an embarrassment." (Eldredge and Stanley op cit p. 272) And Peter Ward, in his 1992 bookrms living fossils "evolutionary curiosities, more embarrassments to the theory of evolution than anything else."

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