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Genetic Epidemiological Studies of Hearing Loss in Faisalabad City, Pakistan

By Sumaira Iqbal, Fazeela Yaqoob & Tayyaba Sultana
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Summary- Basic aim of the study was to investigate the incidence, prevalence, disease pattern and the etiology of the non-syndromic congenital deafness in a selected population from different areas and schools for special education of Faisalabad District, Pakistan. An epidemiological study was carried out through a questionnaire including different standard parameters like surname, parental marriage age, parental relationship of marriage, their family history including information about number of offspring, sex, birth order, number of normal and diseased individuals and age of onset. Information about economic status and educational qualification of parents, their locality, food habits and paternal smoking or non-smoking habits were also recorded. In a total of 436 deaf cases, 55.0% were males and 44.95% were females while 22 families were selected for pedigree analysis. Urban population (79.58%) was affected more than rural population (20.41%). Mean maternal and paternal marriage age was 20.63 ± 0.163 and 24.989 ± 0.217, respectively with smaller (0-4 years) marriage age difference.

Keywords: epidemiology, deafness, inheritance, pedigree.

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Genetic Epidemiological Studies of Hearing Loss in Faisalabad City, Pakistan

Sumaira Iqbal [α], Fazeela Yaqoob [σ] & Tayyaba Sultana [ρ]

Summary- Basic aim of the study was to investigate the incidence, prevalence, disease pattern and the etiology of the non-syndromic congenital deafness in a selected population from different areas and schools for special education of Faisalabad District, Pakistan. An epidem-iological study was carried out through a questionnaire including different standard parameters like surname, parental marriage age, parental relationship of marriage, their family history including information about number of offspring, sex, birth order, number of normal and diseased individuals and age of onset. Information about economic status and educational qualification of parents, their locality, food habits and paternal smoking or non-smoking habits were also recorded. In a total of 436 deaf cases, 55.0% were males and 44.95% were females while 22 families were selected for pedigree analysis. Urban population (79.58%) was affected more than rural population (20.41%). Mean maternal and paternal marriage age was 20.63 ± 0.163 and 24.989 ± 0.217, respectively with smaller (0-4 years) marriage age difference. First (24.54%) and second (22.24%) birth order showed maximum deaf patients. Offspring of first cousin marriages (67.66%) had significantly higher congenital hearing loss affliction than of unrelated couples as demonstrated by consanguineous studies. Coefficient of inbreeding was (F=0.051) high than in general population (F=0.0271). Autosomal recessive mode of inheritance was observed in twenty-two affected families.

Keywords: epidemiology, deafness, inheritance, pedigree.

I. Introduction

Deafness, a sensory defect, affecting 1 / 500-650 newborn children and 250 million people worldwide (Olusanya et al., 2007), of whom two thirds are in developing countries. It is considered to be second major cause of disability. Frequency of hearing loss in Southeast Asia varies from 4.6% to 8.8% (Garg et al., 2009). There are approximately 63 million (India) 28 million (USA) and 9 million (UK) hearing impaired people according to WHO survey. Deafness can be categorized as genetic or non-genetic, prelingual or postlingual, and syndromic or non-syndromic.

Approximately 60% cases of deafness have genetic basis (Mehl and Thomson, 2002). Environmental factors are responsible for upto 40% cases and few are due to unknown causes (Willems, 2000; Reddy et al., 2006). In genetic cases, 85% of the hearing impairment is described as non-syndromic (Kenneson et al., 2002).

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Comparatively to advanced countries, people from developing countries are three to four times more susceptible to deafness largely because of unfavourable environmental factors. Asian, African and Latin American population practice consanguineous marriages frequently, so siblings of these marriages are at high risk of autosomal recessive disorder. Consanguinity basically disturbs the normal genetic pathway and paves the way for the development of hearing loss (Reddy et al., 2006). Autosomal recessive non-syndromic hearing impairment (ARNSHI) can be traced easily in Pakistani population due to the availability of large extended and highly consanguineous pedigrees (Santos et al., 2005). The prevalence of bilateral deafness in Pakistani population is as high as 1.6 per 1000, 60% higher than the world average (Elahi et al., 1998). In Pakistani population 80% marriages are first-cousin and 60% are consanguineous (Hussain, 1998). Neonatal, infant and childhood periods face the highest death rates because of this consanguinity (Bittles, 2001).

For present epidemiological study deaf population was selected at district level to collect data for determination of prevalence rates. Effect of consanguinity on congenital deafness, social and economic status impacts and mode of inheritance of genetic cases were studied.

II. Materials and Methods

The families for genetic epidemiological studies were collected from different schools for special education of district Faisalabad, Total twenty-two families were scored by collecting data of about 436 deaf patients from special schools and different areas of Faisalabad city. These families provided necessary relevant information for genetic epidemiological studies. Family consisted of 4 or 5 generations was considered in which at least 4 or 5 individuals were afflicted with congenital deafness, to get better results.

The details of the family were traced back through the proband. The information was collected from subjects with the help of a data sheet including their surname, parental marriage age, parental relationship of marriage, their family history including information about number of offsprings (sex, birth order), similar and other disease in family, number of normal and diseased individuals in family and the age of onset of disease.

a) Data analysis

The data was analyzed in three ways. Firstly, the sample was analyzed as a whole to get information of population and second in relation of consanguinity. Third pedigrees were draw in order to evaluate the mode of inheritance of disease. Genetic relationships in marriages were classified into first cousins (1C), first cousin once removed (11/2C), second cousins (2C), distant relatives (DR), bradari (B) and unrelated (U) (Shami and Iqbal, 1983).

b) Statistical analysis

The statistical analysis carried out for this study included percentage (%), mean (M), standard error (S.E) and chi-square test (χ^2). Mean coefficient of inbreeding (F-value) was calculated by following the method of Wright (1992).

III. Results

a) General population study

Out of 436 deaf patients, 347 belonged to urban areas and 89 belonged to rural. Male patients were 65.165% in rural and 52.44% in urban areas whereas females were 34.83% and 47.55%, respectively.

b) Parental marriage age

In case of female patients mean maternal marriage age was 20.61±0.262 years whereas mean paternal marriage age was 25.010±0.335 years. Similarly in case of male deaf patients mean maternal and paternal marriage age was 20.654±0.207 and 24.971±0.284, respectively. It was seen that second age group (18-22 years) of maternal marriage was more commonly distributed in deaf male and females than any other age group (Table-1).Children of couples with age difference ranged from 0-4 years had high percentage (59.63 %) of disease. Difference of 2, 3, 4 and 5 years at marriage have high percentages 20.87%, 13.76%, 10.55% and 11.46% of deaf patients, respectively.

Table 1 : Distribution of mean maternal marriage age (MA) of deaf patients in different age groups

Age groups at marriage (Years)	Maternal age of male patients (X ± S.E)	Maternal age of female patients (X ± S.E)	Sexes Combined (X ± S.E)
13-17	16.20 ± 0.208 (25)	16.136 ± 0.136 (22)	16.170 ± 0.127 (47)
18-22	19.940 ± 0.123 (166)	19.609 ± 0.127 (133)	19.793 ± 0.089 (299)
23-27	24.341 ± 0.155 (41)	24.645 ± 0.189 (31)	24.472 ± 0.120 (72)
28-32	29.571 ± 0.481 (7)	29.571 ± 0.297 (7)	29.571 ± 0.272 (14)
33-37	37.0 ± 0.00 (1)	35.333 ± 0.333 (3)	35.750 ± 0.479 (4)

$\chi^2 = 223.96$; d.f=9, $P<0.001$

The number mentioned within parenthesis ( ) is the number of deaf patients.

c) Birth order

Different birth orders of 436 deaf patients were recorded up to 12th birth order. Percentage distribution of combined sex in different birth orders shows that 1st (24.54%), 2nd (22.24%) and 3rd (17.20%) birth order had the highest representation while 9th (0.45%), 10th (0.68%) and 12th (0.229%) birth order had the lowest representation. In male deaf patients 1st (29.16%) and 2nd (22.08%) birth order and in female deaf patients 2nd (22.44%) and 4th (21.42%) birth order showed maximum percentages. Tenth and 12th birth order (0.416%) in males and 8th birth order (0.51%) in females were least suffered (Table-2).

Table 2 : Percentage distribution of deaf males and females in different birth orders

Sex		1st order	2nd order	3rd order	4th order	5th order	6th order	7th order	8th order	9th order	10th order	11th order	12th order
Males	No	70	53	36	31	20	14	6	6	2	1	-	1
	%	29.16	22.08	15.0	12.91	8.34	5.83	2.5	2.5	0.834	0.416	-	0.416
Females	No	37	44	39	42	18	8	5	1	-	2	-	-
	%	18.87	22.44	19.89	21.42	9.18	4.08	2.55	0.51	-	1.02	-	-
Combined Sex	No	107	97	75	73	38	22	11	7	2	3	-	1
	%	24.54	22.24	17.20	16.74	8.715	5.04	2.52	1.60	0.45	0.68	-	0.229

d) Socio- economic status, life style and education

Highest percentage representation of deaf patients was seen in skilled manual occupation (43.34%), followed by professional-managerial (19.03%) and unskilled categories (14.90%), respectively. Distribution of deaf patients according to their educational level was in primary (49.77%), Middle (14.90%), Matric (13.30%) and college education (2.52%), respectively. Ratio of uneducated smokers (53.45%) and non-smokers (34.29%) were highest in representation as compared to educated non-smokers (4.33%) and smokers (0.628%), respectively.

e) Consanguinity and deafness

Deaf patients were explored on the parental consanguinity basis, showed first cousin (67.66%), first cousin once removed (0.458%), second cousin (0.68%), distant relations (11.23%), bradari (5.27%) and unrelated spouses (14.67%), respectively. First cousin marriage couples had maximum number of affected children as compared to unrelated. Table-3 shows analysis of goodness of fit for father's occupation and different genetic relationships of deaf patients, which indicated that father's occupation and genetic relationships had highly significant effect on the development of deafness (χ^2 = 68.774; d.f = 25; p< 0.01). Educational contributions and different genetic relationships of parents were also compared in deaf patients that indicated a highly significant effect of education and genetic relationships on deafness (Table-4) (χ^2 = 349.41; d.f = 40; p< 0.01).

Table 3 : Test of goodness of fit between father's occupation and different genetic relationships of deaf patients

Genetic relationships	Father's occupation						Total
	I	II	IV	V	VI	VII	
1C	57	39	125	2	42	30	295
	(56.16)	(32.48)	(127.88)	(2.71)	(43.98)	(31.80)	(295.0)
$1^{1/2}$C	-	-	-	1	1	-	2
	(0.38)	(0.22)	(0.87)	(0.02)	(0.30)	(0.22)	(2.00)
2C	1	-	2	-	-	-	3
	(0.57)	(0.33)	(1.30)	(0.03)	(0.45)	(0.32)	(3.00)
B	4	2	11	1	3	2	23
	(4.38)	(2.53)	(9.97)	(0.21)	(3.43)	(2.48)	(23.00)
DR	9	2	24	-	9	5	49
	(9.33)	(5.39)	(21.24)	(0.45)	(7.31)	(5.28)	(49.00)
U	12	5	27	-	10	10	64
	(12.18)	(7.05)	(27.74)	(0.59)	(9.54)	(6.90)	(64.00)
Total	83	48	189	4	65	47	436

χ^2 = 68.774; d.f =25 P < 0.01. The value mentioned within parenthesis ( ) is the expected value 1C= First cousin.$1^{1/2}$= First cousin once removed.2C= Second cousin.B = Bradari

Table 4 : Test of goodness of fit between parental educational combinations and genetic relationships

Genetic Relationships	FATHER / MOTHER'S EDUCATION								
	N/N	N/S	S/N	S/S	S/C	C/N	C/S	C/C	U/U
1C	106 (106.23)	10 (15.56)	61 (52.10)	85 (87.96)	- (1.35)	2 (2.30)	19 (16.92)	6 (6.09)	6 (6.77)
$1^{1/2}$C	- (0.72)	- (0.11)	- (0.35)	1 (0.60)	- (0.01)	- (0.01)	- (0.11)	0 (0.04)	1 (0.05)
2C	- (1.08)	- (0.16)	- (0.53)	1 (0.89)	2 (0.01)	- (0.02)	- (0.17)	- (0.06)	- (0.07)
DR	17 (17.64)	6 (2.58)	4 (8.65)	17 (14.61)	- (0.22)	- (0.34)	2 (2.81)	- (1.01)	3 (1.12)
B	7 (8.28)	5 (1.21)	3 (4.06)	8 (6.86)	- (0.11)	- (0.16)	- (1.32)	- (0.47)	- (0.53)
U	27 (23.05)	2 (3.38)	9 (11.30)	18 (19.08)	- (0.29)	1 (0.44)	4 (3.67)	3 (1.32)	- (1.47)
Total	157 (157.0)	23 (23.00)	77 (77.00)	130 (130.0)	2 (2.00)	3 (3.00)	25 (25.00)	9 (9.00)	10 (10.0)

$\chi^2 = 349.412$; d.f =40, $P < 0.01$

The value mentioned within parenthesis ( ) is the expected value
N = Nil
S = School
C = College/University
U = Unknown

f) Disease in family

In 436 deaf patients, 282 (64.67%) cases had this disease in their family. Out of which 148 (52.48%) males and 134 (47.51%) females were those who had the same disease in their family, whereas 92 male (59.74%) and 62 female (40.25%) cases did not have family history for the disease. Table-5 represents the distribution of deaf males and their relatives diagnosed for the same disease. One forty eight affected males had 284 (47.17%) affected relatives. Among those the close blood relatives such as father, mother, daughter, son, sister and brother were 181 (63.73%) followed by 13 paternal (4.57%) and 8 maternal relatives (2.8%). 82 affected relatives (28.87%) were kept in category of others. One thirty four affected females had higher affected relative number (318) than that of males (284) and these affected relatives consisted of 188 close blood relation (59.11%), 15 maternal (4.71%), 14 paternal relatives (4.4%) and 101 (31.76%) included all these three relations (Table-6).

Table 5 : Distribution of deaf males and their relatives diagnosed for the same disease

Type of Relation	Affected Relatives	No of Affected Relatives	No of cases
Only Close Blood Relation Relatives	Only Sister	19	18
	Only Brother	51	42
	Only Mother	1	1
	Sister + Brother	88	34
	F+ M+ S+ B+ D+ Son	22	7
Only Maternal Relatives	M.G.F+ M.G.M+ M.A+ M.U+ M.C	8	7
Only Paternal Relatives	P.G.F + P.G.M + P.A + P.U + P.C	13	11
Close blood relation Relatives & Maternal-Paternal Relatives	F+ M+ S+ B+ D+ Son+ P.G.F+ P.G.M+ P.U+ P.A+ P.C+ M.G.F+ M.G.M+ M.A+ M.C+ M.U+ M.N+W	82	8
	Total	284	148

F = Father P.G.F = Paternal-grandfather, M = Mother P.G.M = Paternal-grandmother
S = Sister P.U = Paternal uncle B = Brother P.A = Paternal Aunt
D = Daughter P.C = Paternal Cousin W = Wife P.N = Paternal nephew
H = Husband M.G.F = Maternal grandfather M.G.M = Maternal grandmother
M.A = Maternal Ant M.U = Maternal uncle M.C = Maternal cousin M.N = Maternal nephew

Table 6 : Distribution of deaf females and their relatives diagnosed for the same disease

Type of Relation	Affected Relatives	No of Affected Relatives	No of cases
Only Close Blood Relation Relatives	Only Sister	45	31
	Only Brother	23	21
	Only Son	3	1
	Sister + Brother	97	34
	F+ M+ S+ B+ D+ Son	20	5
Only Maternal Relatives	M.G.F+ M.G.M+ M.A+ M.U+ M.C	15	8
Only Paternal Relatives	P.G.F + P.G.M + P.A + P.U + P.C	14	7
Close blood relation Relatives & Maternal-Paternal Relatives	F+ M+ S+ B+ D+ Son+ P.G.F + P.G.M + P.U + P.A+P.N+P.C+M.G.F + M.G.M +M.A+ M.C+ M.U+ M.N+H	101	27
	Total	318	134

F = Father, P.G.F = Paternal-grandfather, M = Mother, P.G.M = Paternal-grandmother
S = Sister, P.U = Paternal uncle, B = Brother, P.A = Paternal Aunt
D = Daughter, P.C = Paternal Cousin, W = Wife P.N = Paternal nephew
H = Husband M.G.F = Maternal grandfather M.G.M = Maternal grandmother
M.A = Maternal Ant M. U = Maternal uncle M.C = Maternal cousin M. N = Maternal nephew

g) Pedigree analysis

After studying the genetic cases of disease, twenty-two patients with family disease history were selected in total scored cases. Among Mendelian modes of inheritance only autosomal recessive mode was observed.

IV. Pedigree

a) Epidemiology

Pedigree (Fig-1) is an illustration of a Rajput family who is settled in Ali Hassan colony of Faisalabad. Eleven members including six males and five females were affected with congenital deafness. Individual III-5

was proband through which disease was traced back in his family. In first three generations, no affected individual was found except one affected male (III-5) produced in third generation. In this generation, first consanguineous marriage produced two affected sons (IV-1 and IV-3) and two affected daughters (IV-4, IV-6). But the second first cousin marriage of an affected male and normal female (III-5 and III-4) produced one affected daughter (IV-10), two affected sons (IV-7 and IV-8) and one normal son (IV-12). In fourth generation, two marriages were practiced, first was a consanguineous marriage between two congenitally deaf persons (IV-6 and IV-7) that produced all affected offsprings including one male (V-3) and two females (V-1 and V-2). Whereas second consanguineous marriage between an affected female and normal male (IV-10 and IV-11) produced three normal daughters (V-4, V-5 and V-6).

b) Result

This pedigree also shows an autosomal recessive mode of inheritance (Fig-1).

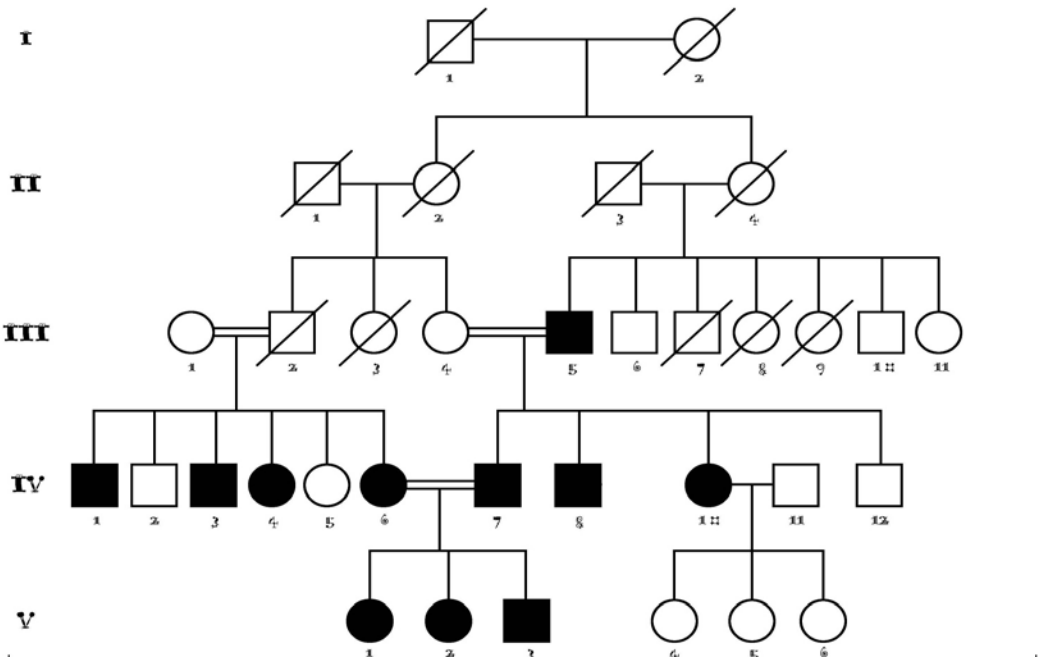

Figure 1 : pedigree reflecting an autosomal recessive mode of inheritance

V. Discussion

This study showed that males were more liable to congenital deafness as compared to females. Same results were found by Liu et al. (1999). Mean maternal marriage age and mean paternal age was 20.63 ± 0.163 and 24.989±0.217 recorded. Early age parental marriages could be a strong risky factor but it needs further investigation.

According to birth order study, 1st (24.54%), 2nd (22.24%) and 3rd (17.20%) birth orders were mostly affected with disease as compared to other birth orders irrespective of sex (Table-5). No supporting evidence is encountered on the importance of birth order because detailed literature review is silent on this aspect. Present study revealed that disease was common in lower social class (Category-IV), which was the case of skilled manual. This finding is comparable with the work of Bafaquee et al. (1994).

Highest percentage of deaf offspring was observed in uneducated people (49.77%) sector as compared to educated ones (2.52%). These investigations clearly show that lack of education increases the risk of disease that was also reported by Bafaquee et al. (1994).

In Pakistan first cousin marriages are more common and rates of inbreeding ranges from 37.8% to 48.9%. Calculated coefficient of inbreeding (F) for general population ranged from 0.0236 to 0.0286 (Shami et al., 1990).

Das (2006) examined that there was an increase in genetic disorders with an increase in inbreeding in almost all populations. Consanguineous children had more familial aggregation of disease. The consanguinity rate was too high which is in agreement with Ansari et al. (2004). In Iran, the frequency of consanguinity of parents was 59.7% in congenitally malformed population and 31.5% in normal population (Khushki and Zeyghami, 2005).

It was found that most common parental relationship was 1st cousin marriages (67.66%) than unrelated marriages (14.67%). These findings are in accordance with those of Bafaquee et al. (1994), Zakzouk (2002), Bener and Hussain (2006) and Reddy et al. (2006).

Socio economic status showed significant ($P<0.01$) influence on occurrence of congenital deafness among different marriage relationships. Education of parents also had significant effects ($P<0.01$) on the occurrence of disease in their children. (Table-4). Similar arguments are reported by Bittles (2001) and Aber et al. (2005) for Muslim populations.

Only Mendelian mode of autosomal recessive inheritance pattern was observed in this study. Marazita et al. (1993) found that 62.8% causes of early onset deafness were genetic in which 47.1% were recessive and 15.7% were with dominant cases. Same analysis was revealed by Longtiano and Brunoni (2000). Park et al. (2003) concluded that recessive mutations are common cause of deafness due to consanguineous matings in Pakistani and Indian populations. Calapoglu et al. (2005), Zolotogora and Barges (2003) also reported the same findings in Muslim Israeli population.

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Classification Model for the Heart Disease Diagnosis

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Abstract- Medical science industry has huge amount of data, but unfortunately most of this data is not mined to find out hidden information in data. Advanced data mining techniques can be used to discover hidden pattern in data. Models developed from these techniques will be useful for medical practitioners to take effective decision. In this research work, we have analyzed the performance of the classification rule algorithms namely PART based on K-Means Clustering algorithms. The k-means is the simplest, most commonly and good behavior clustering algorithm used in many applications. Firstly the preprocessed heart disease dataset is grouped using the K-means algorithm with the K =2 values on classes to cluster evaluation testing mode. After that data mining classification rule algorithms namely Projective Adaptive Resonance Theory are analyzed on clustered relevant dataset. In our studies 10-fold cross validation method was used to measure the unbiased estimate of the prediction model. Accuracy of K-Means Clustering, PART and PART based on K-Means Clustering are 81.08%, 79.05% and 84.12% respectively.

Keywords: heart disease, data mining techniques, classification rules, k-means clustering, and part.

GJMR-F Classification : NLMC Code: WG 200, WG 205

Strictly as per the compliance and regulations of:

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Atul Kumar Pandey [α] Prabhat Pandey [σ] & K.L. Jaiswal [ρ]

Abstract- Medical science industry has huge amount of data, but unfortunately most of this data is not mined to find out hidden information in data. Advanced data mining techniques can be used to discover hidden pattern in data. Models developed from these techniques will be useful for medical practitioners to take effective decision. In this research work, we have analyzed the performance of the classification rule algorithms namely PART based on K-Means Clustering algorithms. The k-means is the simplest, most commonly and good behavior clustering algorithm used in many applications. Firstly the preprocessed heart disease dataset is grouped using the K-means algorithm with the K =2 values on classes to cluster evaluation testing mode. After that data mining classification rule algorithms namely Projective Adaptive Resonance Theory are analyzed on clustered relevant dataset. In our studies 10-fold cross validation method was used to measure the unbiased estimate of the prediction model. Accuracy of K-Means Clustering, PART and PART based on K-Means Clustering are 81.08%, 79.05% and 84.12% respectively. Our analysis shows that out of these three classification models Classification based on Clustering predicts cardiovascular disease with improved accuracy.

Keywords: heart disease, data mining techniques, classification rules, k-means clustering, and part.

I. Introduction

Accurate and error-free of diagnosis and treatment given to patients has been a major issue highlighted in medical service nowadays. Quality service in health care field implies diagnosing patients correctly and administering treatments that are effective [11].Hospitals can also minimize the cost of clinical tests by employing appropriate computer-based information and/or decision support systems. Most hospitals today use some sort of hospital information systems to manage their healthcare or patient data [10]. These systems generate huge amounts of data which take the form of numbers, text, charts and images.

Data mining is the process of extracting hidden patterns from large data sets. Data mining is a searching process done automatically for hidden patterns present in a large database [2]. Data mining is an iterative process. Its progress is defined by discovery, through either automatic or manual methods. Data mining is reflected in its wide range of methodologies and techniques [8]. These techniques can be applied to a connection of problem sets. Classification deals in generating rules that partition the data into disjoint groups. Classification is a data mining (machine learning) technique used to predict group membership for data instances [4]. The goal of the classification is to assign a class to find previously unseen records as accurately as possible. Classification process consists of training set that are analyzed by a classification algorithms and the classifier or learner model is represented in the form of classification rules [9].

There are various kinds of classification method including decision tree induction, Bayesian networks, k-nearest neighbor classifier, case-based reasoning, genetic algorithm and fuzzy logic techniques. Systems that construct classifiers are one of the commonly used tools in data mining. Such systems take as input a collection of cases, each belonging to one of a small number of classes and described by its values for a fixed set of attributes, and output a classifier that can accurately predict the class to which a new case belongs [7].

Our goal is to use the publicly available dataset heart disease, and use PART and K-Means data mining algorithms to predict about heart disease, analyses the results and use the rules generated by these algorithms for further predictions. The rest of this paper is organized as following. Section II provides a review of literature. The problem definition is given in Section III. Subsequently, our proposed approach is discussed in Section IV. The experimental results are given in Section V. Finally, Section VI gives the conclusion and future work.

II. Related Works

A classification rule or classifier is a function that can be evaluated for any possible value specifically given the data it will yield a similar classification. In a binary classification, the elements that are not correctly classified are named false positives and false negatives [12]. Some classification rules are static functions. There are various classification rule algorithms namely OneR, Ridor, Conjuctive Rule etc. There are two types in extracting classification rules namely direct method and

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indirect method. In direct method the rules are extracted from data [5]. In indirect method the rules are extracted from other classification models. The classification rules are also known as if then rules.

In [1], the author proposed enhanced K-Means clustering algorithm for predicting coronary heart disease. There are two strategies are used for enhancing K-means clustering algorithm. First the author proposed weighted ranking algorithm to overcome the problem of random selection of initial centroids. Second the attributes associated with weights concerned by the physicians are taken into account in both ranking and the K-means algorithm instead of assigning unit weight to all the attributes. The heart dataset was collected from UCI machine learning repository. Moreover 35 conditions are carried out to assign weights to attributes. This paper describes about the rule based classification algorithm namely Part and Simple K-Means clustering algorithm. In this paper we review about the role of those two algorithms in various concepts.

III. Problem Definition

Given a dataset D, a set of classes C, a set of classification rules R over D through the algorithms K-Means, Part and Part based on K-Means, find the best algorithm using some the performance factors.

IV. Proposed System

In the proposed system a clear view of the two algorithms is given. This section discusses a brief description of the two data mining algorithms.

a) K-Means Clustering Algorithm

Clustering the medical data into small with meaningful data can aid in the discovery of forms by supporting the abstraction of several suitable features from each of the collections thereby introducing party into the data and helping the application of orthodox data mining techniques. The k-means is the simplest, most commonly and good behavior clustering algorithm used in many applications [3, 6]. The simplicity is due to the use of squared error as the stopping criteria, which tends to work well with isolated and compact clusters. Its time complexity depends on the number of data points to be clustered and the number of iteration. The K mean algorithm works on the Euclidian Distance Method, is initialized from some random or approximate solution.

K-means groups the data in accord with their individual values into k distinct collections. Data categorized into the identical cluster have a like feature values. K, the positive number representing the number of collections, needs to be delivered in advance. The phases convoluted in a k-means algorithm are given consequently:

Prophecy of heart disease using K – Means clustering techniques

- K points denoting the data to be bunched are positioned into the space. These points signify the primary collection centroids.
- The data are consigned to the group that is nearby to the centroids.
- The points of all the K centroids are again calculated as swiftly as all the data are allotted.
- Steps 2 and 3 are repeated until the centroids stop affecting any further. This results in the isolation of data into groups from which the metric to be diminished can be reflected.

The preprocessed heart illness data is grouped using the K-means algorithm with the K values. Clustering is a type of multivariate statistical examination also known as cluster analysis, unsupervised classify-cation analysis, or numerical taxonomy. K-Means clustering produces a definite number of separate, flat (non-hierarchical) clusters.

b) Classification Rule Based PART Algorithm

Classification is a concept or process of finding a model which finds the class of unknown objects. It basically maps the data items into one of the some predefined classes. Classification model generate a set of rules based on the features of the data in the training dataset. Further these rules can be use for classification of future unknown data items. Classification is the one of the most important data mining technique. Medical diagnosis is an important application of classification for example; diagnosis of new patients based on their symptoms by using the classification rules about diseases from known cases.

PART stands for Projective Adaptive Resonance Theory. The input for PART algorithm is the vigilance and distance parameters [13].

i. *Initialization*

Number m of nodes in F1 layer:=number of dimensions in the input vector. Number m of nodes in F layer: =expected maximum number of clusters that can be formed at each clustering level.

Initialize parameters L, ρo, ρh, σ, α, θ, and e.

1. Set ρ = ρo.
2. Repeat steps 3 – 7 until the stopping condition is satisfied.
3. Set all F2 nodes as being non-committed.
4. For each input vector in dataset S, do steps 4.1-4.6.

Compute hij for all F1 nodes vi and committed F2 nodes vj. If all F2 nodes are non committed, go to step 4.3.

a. Compute Tj for all committed F2 nodes Vj.
b. Select the winning F2 node VJ. If no F2 node can be selected, put the input data into outlier 0 & then continue to do step 4.
c. If the winner is a committed node, compute rJ, otherwise go to step 4.6.
d. If rJ >= ρ, go to step 4.6, otherwise reset the winner VJ and go back to step 4.3.

e. Set the winner VJ as the committed and update the bottom-up and top-down weights for winner node VJ.

5. Repeat step 4 N times until stable clusters are formed (i.e. until the difference of output clusters ay N-th and (N-1)-th time becomes sufficiently small).
6. For each cluster Cj in F2 layer, compute the associated dimension set Dj. Then, set S= Cj and set ρ = ρ + ρh (or ρ = | D |= ρh), go back to step 2.
7. For the outlier O, set S = 0, go back to step 2.

Fig. 1 : Algorithm for PART

V. Experimental Results

The above two algorithms are combined using dataset namely Heart Disease. These dataset are collected from UCI Repository in the website www.ucirepository.com. The heart disease dataset contains 303 instances and 14 selected attributes. Initially dataset contained some fields, in which some value in the records was missing. These were identified and replaced with most appropriate values using ReplaceMissingValues filter from Weka 3.7. This process is known as Data Preprocessing. After pre-processing the data, data mining clustering and classification techniques namely Simple K-Means Clustering and PART were applied.

To measure the stability of the performance of the proposed model the data is divided into training and testing data with 10-fold cross validation. A confusion matrix shows how many instances have been assigned to each class. In our experiment we have two classes or clusters, and therefore we have a 2x2 confusion matrix. The entries of this matrix are used to explain the performance measures. The following charts and figure are based on the combined made of two algorithms namely K-Means and PART for heart disease dataset.

We are evaluating the performance of Simple K-Means algorithm Clustering using the mode of classes to clusters evaluation with the prediction attribute nom. Table 1, Table 2, Table 3 and Table 4 illustrates the confusion matrix of Simple k-means, PART, PART via Simple K-means (Classification via Clustering) and Accuracy of algorithm respectively. Results shows that 169 (56%) records are grouped into cluster 0 and 134 (44%) to cluster 1. Cluster 1 those who have heart disease and cluster 0 has no heart disease.

Table 1 : Confusion Matrix of K-Means

		Actual Class	
Predicted Class		1	0
	Cluster 1 <-- 0	27	138
	Cluster 0 <-- 1	107	31

Table 2 : Confusion Matrix of PART

		Actual Class	
Predicted Class		1	0
	a=1	131	28
	b=0	34	110

Table 3 : PART via Simple K-Means clustering

		Actual Class	
Predicted Class		b	a
	b=cluster 1	125	9
	a=cluster 0	12	157

Table 4 : Comparison of Data Mining Techniques

Classification Techniques	Time(seconds)	Accuracy %
Simple K-Means	0.02	80.858
PART	0.06	79.538
PART via K-Means	0.02	93.0693

Table 5 illustrates the number of rules created by PART algorithm without K-Means, PART based on K-Means. Figure 2 & 3 illustrates the rules generated by Part and Part with cluster relevant data where class value 0 & cluster value 1 has heart disease.

Table 5 : No. of Rules generated by Algorithm

Classification Techniques	No. of Rules
PART	26
PART via Simple K-Means Clustering	11

PART DECISION LIST

1) ca > 0.674497 AND cp = asympt AND sex = male: 0 (62.0/2.0)
2) thal = normal AND ca <= 1 AND slope = up AND fbs = f AND exang = no AND age <= 56: 1 (54.0/1.0)
3) oldpeak > 2.4 AND thal = reversable_defect: 0 (16.0/1.0)
4) thal = normal AND ca <= 1 AND slope = up AND fbs = t: 1 (10.0)
5) thal = normal AND age <= 45: 1 (16.0)
6) exang = no AND sex = female AND fbs = f AND thal = normal: 1 (32.0/3.0)
7) slope = flat AND sex = female: 0 (17.0/2.0)
8) sex = female: 1 (6.0/1.0)
9) slope = up AND fbs = t: 1 (5.0)
10) ca <= 1 AND thal = normal AND exang = yes: 1 (7.0/1.0)
11) exang = yes AND chol > 243: 0 (10.0)
12) fbs = t AND ca <= 0: 1 (5.0)
13) oldpeak > 0.7 AND slope = flat: 0 (19.0/3.0)
14) exang = yes: 1 (6.0/1.0)
15) ca <= 1 AND thal = fixed_defect: 1 (4.0)
16) ca <= 1 AND thal = normal AND slope = up AND chol <= 271: 1 (4.0/1.0)
17) ca <= 1 AND thal = normal AND slope = flat: 1 (3.0)
18) restecg = left_vent_hyper AND cp = typ_angina: 0 (3.0/1.0)
19) cp = atyp_angina AND slope = up AND trestbps > 122: 0 (3.0/1.0)
20) cp = atyp_angina: 1 (5.0/1.0)
21) ca <= 1 AND slope = flat AND ca <= 0: 1 (3.0/1.0)
22) slope = up AND thal = normal: 0 (3.0)
23) slope = up AND cp = asympt AND restecg = normal: 1 (3.0/1.0)
24) cp = asympt: 0 (2.0)
25) slope = up: 1 (2.0)
26) : 0 (3.0/1.0)

Fig. 2 : Generated Rules by PART

PART DECISION LIST ON CLUSTERED RELEVANT DATA

1) exang = yes AND num = 0: cluster1 (76.0)
2) thal = normal AND exang = no AND slope = up: cluster0 (92.0)
3) restecg = normal AND cp = non_anginal: cluster0 (23.0)
4) restecg = normal AND cp = atyp_angina: cluster0 (11.0)
5) restecg = normal AND sex = female: cluster0 (7.0)
6) cp = atyp_angina AND age <= 60: cluster0 (9.0)
7) restecg = left_vent_hyper AND cp = asympt: cluster1 (29.0)
8) age <= 53: cluster0 (17.0/3.0)
9) exang = no AND slope = flat AND thal = reversable_defect: cluster1 (15.0)
10) exang = no AND fbs = f AND oldpeak <= 3.6: cluster0 (13.0)
11) : cluster1 (11.0)

Fig. 3 : Rule Generation by PART via K-Means

Figure 4 & 5 illustrates the threshold curve of PART algorithm for class 1 & 0. We can say that the area under ROC= 0.831.

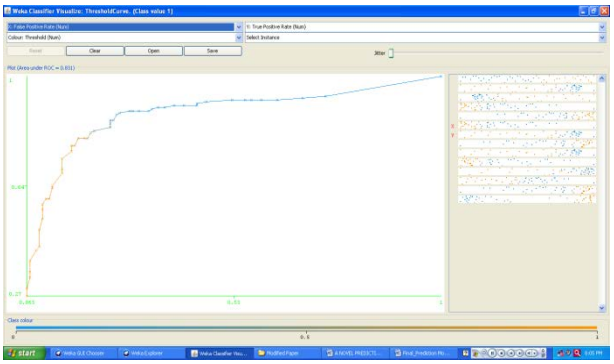

Fig. 4 : Threshold Curve of PART for Class 1

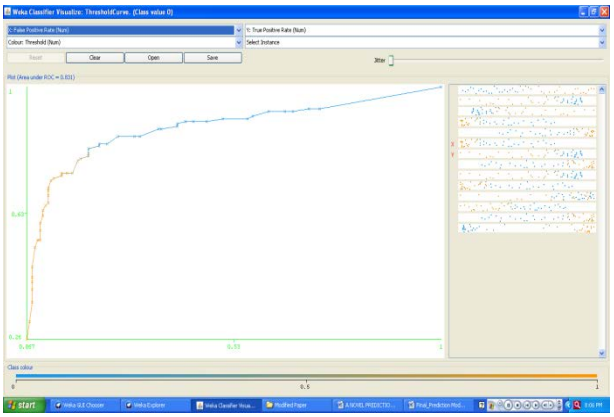

Fig. 5 : Threshold Curve of PART for Class 0

Fig. 5: Threshold Curve of PART for Class 0

Figure 6 & 7 illustrates the threshold curve of PART algorithm for class value cluster1 & cluster0. We can say that the area under ROC= 0.959.

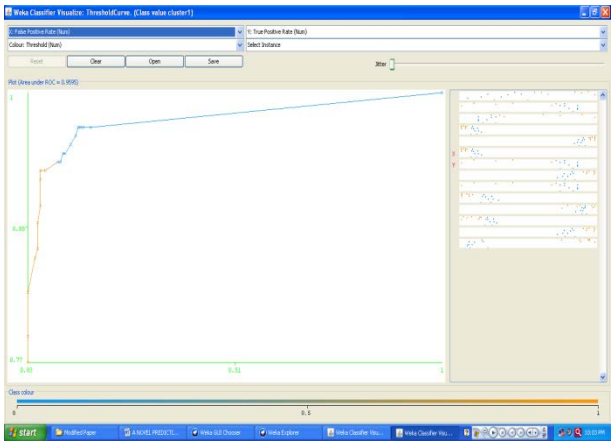

Fig. 6 : Threshold Curve of PART for Class value cluster 0

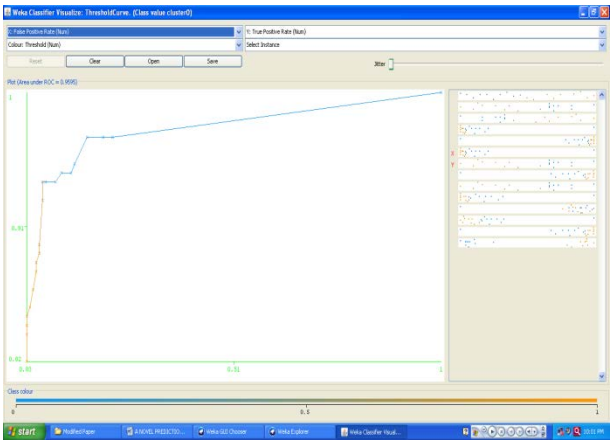

Fig. 7 : Threshold Curve of PART for Class value cluster 0

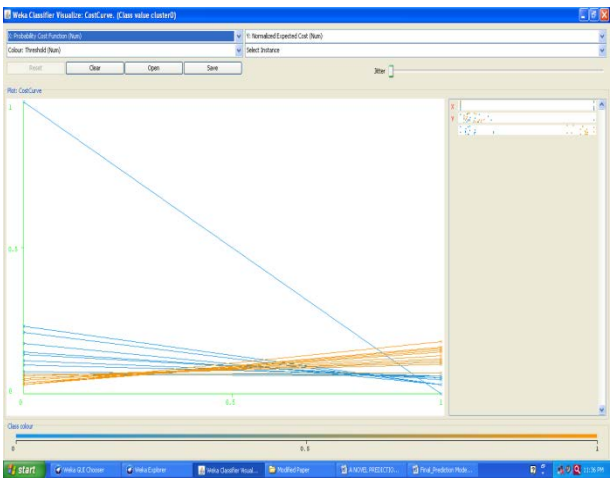

Figure 8 & 9 : Cost Curve for Class value Cluster0

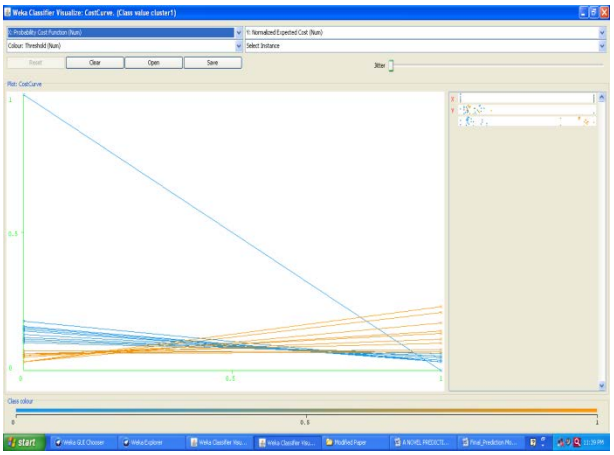

Figure 9 : Cost Curve for Class value Cluster1

VI. Conclusion and Future Work

Around 18 million people 7% of the Indians are affected by heart disease. Heart disease is mostly affected the person under the age of 65. In this paper, we have compared PART and PART based on K-Means Clustering algorithms which are very suitable for generating rules in classification technique. The classification rule generation algorithms generates classification rules which is both sensitive and non sensitive. There are different data mining techniques that can be used for the identification and prevention of cardiovascular disease among patients. Our studies showed that Part based on K-Means Clustering turned out to be best classifier for cardiovascular disease prediction.

In our future work, we have planned to design and develop an efficient heart attack prediction system with Patient Prescription Support using the web mining and data warehouse techniques. New algorithms and techniques are to be developed which overcome the drawbacks of the existing system. In future some privacy preserving technique can be induced for the rule generation in the classification technique. We intend to improve performance of these basic classification techniques by creating Meta model which will be used to predict cardiovascular disease in patients.

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Risk Factors Associated with Transmission of Hepatitis B and Hepatitis C Virus in Pakistan

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Abstract- In Pakistan about 7 to 9 million people are living with HBV and 10 million people are living with HCV, with higher morbidity and mortality. This article reviews prevalence of Hepatitis B and Hepatitis C virus in Pakistan and risk factors associated with transmission of viral hepatitis. A literature search was conducted on research articles from Pubmed, PakMediNet and Google scholar. Prevalence of HBV and HCV infection varies in different regions due to inadequate knowledge and non implementation of international health standards. Majority of Pakistani population lives in rural areas as compared to urban areas. But unfortunately, up to date, no prevalence study has been reported from rural areas of Pakistan depicting HBV and HCV infection. Prevalence of HBV in general population, peds, pregnant women and IDUs was reported 4.5%, 1.8%, 0.34% to 12.62% and 22.4% respectively.

Keywords: hepatitis B virus, hepatitis C virus, risk factors, awareness, needle stick injuries, barbers, blood transfusions.

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Risk Factors Associated with Transmission of Hepatitis B and Hepatitis C Virus in Pakistan

Umar Saeed [α] & Sobia Manzoor [σ]

Abstract- In Pakistan about 7 to 9 million people are living with HBV and 10 million people are living with HCV, with higher morbidity and mortality. This article reviews prevalence of Hepatitis B and Hepatitis C virus in Pakistan and risk factors associated with transmission of viral hepatitis. A literature search was conducted on research articles from Pubmed, PakMediNet and Google scholar. Prevalence of HBV and HCV infection varies in different regions due to inadequate knowledge and non implementation of international health standards. Majority of Pakistani population lives in rural areas as compared to urban areas. But unfortunately, up to date, no prevalence study has been reported from rural areas of Pakistan depicting HBV and HCV infection. Prevalence of HBV in general population, peds, pregnant women and IDUs was reported 4.5%, 1.8%, 0.34% to 12.62% and 22.4% respectively. Prevalence of HCV in general adult population, pediatric population, young population applying for recruitment, injecting drug users and multitransfused population was reported 4.95%, 1.72%, 3.64%, 57% and 48.67% respectively. Due to rapidly increasing threat of viral prevalence in Pakistani societies, it is hypothesized that Pakistan neither need enemies nor nuclear war; instead its rapidly increasing hepatitis epidemics can potentially wipeout the entire nation.

Keywords: hepatitis B virus, hepatitis C virus, risk factors, awareness, needle stick injuries, barbers, blood transfusions.

I. Introduction

The HBV and HCV are blood borne pathogens, frequently causing deaths among general populations and various high risk populations. HBV and HCV were discovered in 1963 and 1975 respectively. HBV infected 2 billion people worldwide and about 400 million of them were chronically infected (Ali et al., 2011; Li, et al., 2010; Zhu, et al., 2008; Alam, et al., 2007). The HBV and HCV infection constitutes approximately 530 million of 6 billion world population (Hwang, et al., 2006; WHO, 2000; National Foundation for Infectious Diseases, 2012). WHO has declared South East Asia a high risk area for HCV with prevalence rate of 2.15% (WHO, 2000). Liver cirrhosis develops in 20% of HCV infected patients after 10-20 years, while liver cancer usually appears after 20-40 years post infection (Denson, 2005). In Pakistan, 7 to 9 million people are living with HBV with an approximate carrier rate of 3 to 5% (Ali, et al., 2011). While about 10 million people are living with HCV in Pakistan. Asymptomatic spread of chronic infection is major dilemma, which significantly contributes toward dissemination of lethal viral infection to others in society (Farooqi, et al., 2007). Horizontal transmission in early childhood is major contributing factor for chronic viral hepatitis infection in Pakistan (Mujeeb, et al., 1997). The perinatal transmission is leading cause of high rate of chronic infection in developing countries of Asia and Africa, whereas parenteral transmission is frequent cause of cases reported from developed industrialized countries (Maddrey, et al., 2000). Among injection drug, paid blood donors and multitransfused thalassemia populations, there is an increased transmission risk of transfusion transmitted HBV and HCV infections. In developing countries, increased transmission of HBV and HCV is due to non implementation of international standards on blood transfusions, perinatal transmission, intranasal cocaine use, shared shaving equipments, intravenous drug users, tattoos, sexual activity, needle stick injuries, body piercing, hemodialysis, hemophilia and transplants.

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II. Literature Search

A literature search was performed via accessing research articles of previous two decade from PakMediNet, Pubmed and Google Scholar with key words of Hepatitis B virus and Hepatitis C virus associated risk factors, barbers, needle stick injuries, blood transfusion. The valued information was subjected for review.

III. Hepatitis B Virus in Pakistan

There exists a limited knowledge in general population about epidemiological patterns of hepatitis B prevalence in different communities of Pakistan (Waheed, et al., 2010). Noorali et al. reported prevalence of HBV in general population of Karachi to be of 4.5% (Noorali, et al., 2008). According to Chaudhary et al. the prevalence of HBV in individuals from Rawalpindi was approximately 2.3% (Chaudhary, et al., 2007). It has been reported that the prevalence of HBV in peds was 1.8% (Jafri, et al., 2006). In a study conducted on recruitment individuals from different areas of Pakistan, the prevalence of HBV was reported to be of 3.2% (Mirza, et al., 2006). Several seroprevalence studies have been conducted on blood transfusion populations. Prevalence of HBV in pregnant women is significantly

different in different regions of Pakistan, depending upon availability or absence of hygienic environment. According to various studies conducted on pregnant women, it has been reported that HBV prevalence range between 0.34% (minimum reported rate) to 12.62% (maximum reported rate) (Sheikh, et al., 2009; Yousfani, et al., 2006). Sometimes health care workers are accidentally exposed to blood borne pathogens due to various reasons such as needle prick injuries and contact to patients body fluids. It has been reported that the prevalence o HBV among health care workers from Abottabad was 2.4% (Sarwar, et al., 2008). Similar kind of study was reported from Karachi, with HBV prevalence of 2.4% (Aziz, et al., 2006). Injection drug users and multitransfused population can be considered as populations at risk for bloodborne pathogenic infection.

Unscreened blood supply could be a major threat for transfusion transmitted infections. According to study conducted from Karachi on IDUs, it has been reported that HBV prevalence was 22.4% (Alam, et al., 2007). Although there exist an increased threat of viral infection among multitransfused population, yet due to limited resources and awareness; only few studies have been reported from Pakistan. Majority of Pakistani population lives in rural areas as compared to urban areas. But unfortunately, up to date, no study has been reported from rural areas of Pakistan. According to HBV screening studies conducted in Islamabad, Lahore and Peshawar the prevalence of HBV was reported as 12.4%, 4% and 5% respectively (Hussain, et al., 2003; Khokhar, et al., 2004; Malik and Hussain, 2006). In order to prevent future epidemic of HBV in Pakistan, many efforts are required from both government and public sector authorities. In Pakistan, various vaccination campaigns are being conducted with major emphasis on prevention of HBV infection in neonates. It has been reported by UNICEF-WHO that approximately 73% of Pakistani neonates were vaccinated against hepatitis B virus (WHO/UNICEF, 2008). Frequent vaccination programs should be conducted at national level for people from all age groups in order to decrease the future burden of disease.

IV. Hepatitis C Virus in Pakistan

In 2008 Hakim et al. conducted a study on prevalence of HCV in Karachi with population size of 3820. According to the study the prevalence of HCV was 5.20 among general population (Hakim et al., 2008). It has been reported by Aziz et al. that prevalence of HCV is 1.40% in pediatric population of Karachi, which depicts increased threat of early chronic infection in such individuals (Aziz et al., 2007). In recruitment individuals from Sargodha, HCV prevalence was reported to be 4.41% (Alam et al., 2006). In Hyderabad, Yousfani et al. reported prevalence of HCV to be 16.50%; which describes HCV to be an increasingly health problem in pregnant women (Yousfani et al., 2006). Sultan et al. reported prevalence of HCV to be 4.99% in 41 498 blood donors from different areas of Pakistan. IDUs are considered as high risk population for HCV transmission. Several studies have been conducted on seroprevalence of HCV among IDUs from different areas of Pakistan, with extremely increased percentage prevalence of viral hepatitis. It has been reported by Kuo et al. that HCV prevalence in IDUs of Lahore was 88% which describes an alarming situation. Similarly another study conducted in Karachi, it was reported that 94% of IDUs were HCV positive (Kuo et al., 2006; Altaf et al., 2009). Among health care workers HCV prevalence was reported to be 5.60% (Aziz et al., 2002). Limited studies have been conducted on multitransfused populations like thalassemia, dialysis patients and hemophilia patients. According to literature review the prevalence of HCV in thalassemia and hemophilia patients is approximately 57% and 56% respectively (Shah et al., 2005; Malik et al., 2006). Multitransfused populations are at increased risk of developing viral hepatitis due to limited screening facilities, prior to blood transfusion, at various blood transfusion setups of rural areas and towns. In majority of urban areas absence of healthy blood transfusion facilities and scarcity of quality assurance procedure drag the poor patients towards more serious consequences in term of lethal viral infections. Hepatitis treatment is very expensive and it creates huge burden on Pakistan economy. Government should raise awareness among the nation by frequent use of electronic media and by modifying syllabus of schools and colleges.

V. Risk Factors Associated with Transmission of HBV and HCV

a) Reuse of needles and needle stick injuries

There exist an increased evidence of hepatitis B and hepatitis C virus transmission due to frequent reuse of needles and syringes. It has been reported that there are many group of individuals who are actively involved in repacking and recycling of used needles and syringes. These products are later on supplied at many drug stores. It was further reported that because of refine packaging it becomes very difficult for general public to distinguish between new disposable sterilized needles and repacked unsterilized syringes (Khan, et al., 2000; Simonsen, et al., 1999; Abdul Mujeeb, et al., 2003). It has been reported that during 2002 to 2007, 1382 needle stick injuries occurred at Aga Khan University hospital Pakistan with higher incidence associated with young doctors (28.5%), nurses (20.4%). It has been further reported that approximately 19% of overall injuries occurred during blood collection (Waheed, et al., 2010; WHO unsafe inj, 2000). In order to avoid further burden of disease, there is an urgent demand for alteration in behavior of both patients and

doctors. According to Janjua et al approximately 68% of individuals received injection in previous 3 months and out of those injections only 54% were provided from new syringes (Janjua, et al., 2005). It has been reported that estimated number of injections varies from 8.2 to 13.6 per person per year, which are highest as compared to other developing countries. Among these almost 94.2% were further categorized as unnecessary (Altaf, et al., 2007). It has been reported by Khan et al that 44% of Pakistani population would prefer injections (as compared to oral medicine) as therapeutic options against various ailments (Khan, et al., 2000). Due to poor sanitary conditions in various health sectors, it has been reported that almost 60% of used syringes are not properly destroyed, instead are majorly dumped into general public waste. Persons who are involved in garbage collection are more prone to acquire viral infections due to needle stick injuries (Abdul Mujeeb, et al., 2003; Waheed, et al., 2009).

b) Barbers

In Pakistan, most of HBV and HCV infected individuals have history of shaving from barbers. In 2010, a survey was conducted on 508 barber shops from capital twin cities of Pakistan. It was reported that 99.8% of barbers were washing razor with water. It was further reported that only 39.6% knew about HBV and HCV as bloodborne viral pathogens. There exist moderate awareness about different transmission routes of hepatitis and majority of them were unaware of vaccination (Waheed, et al., 2010). Most of barbers are involved in disposing of used blades in general pubic waste, hence posing higher risk for scavenges and sweepers during garbage handling. Injuries caused by infected blades, could bring havoc in lives of healthy individuals. It has been reported that approximately 80% of barbers applied potash alum stone (also known as Phatkari) on facial cuts in order to prevent bleeding. Using single stone on multiple customers could be a threat for transmission of viral hepatitis B virus, hepatitis C virus and human immunodeficiency virus. Some barbers have high burden of work especially at weekends and holidays. On special occasions (such as Eid days and festivals), the potash alum stone is consumed in just couple of days. It is the property of hepatitis B virus that it can easily survive for more than seven days on solid surfaces and instruments (Downey, 2008). In Muslim community, circumcision is universal. This procedure is mostly performed by barbers in rural and urban areas. Due to lack of awareness and knowledge about transmission of viral hepatitis, most of barbers, during circumcision, use contaminated instruments on multiple clients. This unhealthy practice makes infants prone to bloodborne viral pathogens.

c) Blood Transfusions

In Pakistan, most of the individuals have requirement of healthy blood donation for life saving purpose. Under such circumstances, unscreened pathogen carrying blood could be a potential source of transfusion transmitted infections and future complications. It has been stated by WHO that annual blood transfusions carried out in Pakistan are approximately 1.2-1.5 million (WHO country office in Pakistan, Blood safety, 2009). It has been reported that during blood transfusions carried out in Karachi, only 25% donations were obtained from volunteer donors and 23% of those donations were screened for hepatitis C virus (Luby, et al., 2000). Almost sixty six percent of Pakistani population belongs to rural areas. In these sectors, the blood transfusion facilities are not satisfactory due to absence of organized infrastructure and electricity problem. Replacement donors including friends, family members and relatives are among the major source for blood donations. In order to strengthen the good relations, most of donors hide their health status and thus become willing to support their lives. Identification of most appropriate donors and ensuring proper blood screening prior to donations are the key factors associated with safe blood donation. For safe blood donation, the donors must possess repeated negative results for bloodborne pathogens. Blood requirements are on its peak during pregnancy related issues, traumatic injuries, thalassemia, dialysis, hemophilia. In order to cope with such emergency situations; organized, fair and safe blood transfusion setups must be developed at national level with easy accessibility. There is an urgent demand for implementation of international blood safety standards at various blood transfusion setups to ensure limited risk for transmission of hepatitis B and hepatitis C virus.

d) Conclusion

The prevalence of Hepatitis B virus Hepatitis C viruses is rapidly increasing in different regions of Pakistan due to non implementation of international health standards and limited awareness of HBV and HCV prevention among general and high risk populations. Although public health authorities are raising awareness among general and high risk population by the assistance of electronic and print media, yet unfortunately these efforts are not practiced at majority of Pakistani rural areas. In order to decrease future burden of disease preventive measures should be adopted, these includes; proper sterilization of health care instruments, use of disposable syringes and new razor blades and screening of blood against transfusion transmitted infectious agents.

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How to Evaluate the Risk of Malnutrition in Patients with Copd?

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Abstract- *Background:* The risk of malnutrition in patients with COPD increases the length of hospital stay, early readmission rates and poorer prognosis. Malnutrition is a significant problem in COPD and often goes undetected and often untreated. Many patients with COPD suffer with poor dietary intake and consequently reduced muscle mass.

Aim & Objective: To evaluate the effect of duration of disease and malnutrition in patients with COPD.

Material And Methods: Ten patients with COPD both male and female) aged 30-50 yrs were recruited in this study. After getting informed consent the subjects were instructed to fill the questionnaire for the history related to our study. The subjects Body Mass Index (BMI Kg/m2), Body surface area, Duration of Disease, Skinfold thickness (Caliper), Calories intake, and Pulmonary function tests (RMS Polyrite) were evaluated.

Keywords: *malnutrition, COPD, body mass index, skinfold thickness, calories intake, body surface area.*

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Strictly as per the compliance and regulations of:

How to Evaluate the Risk of Malnutrition in Patients with Copd?

Chandra Selvi. E [α], Saikumar. P [σ] & Naveen Kumar [ρ]

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Results: A significant individual patients variation was observed in our study. The mean BMI of the patients was (23.45±6.34) found to be reduced than normal. Duration of the disease (2yrs-28yrs) was negatively correlated with BMI, Free Fat Mass, Calorie intake and Expiratory Flow Rates (55%-65% pred). By using skinfold thickness (Biceps, Triceps, Sub scapular, Waist, Knee, Calf) Free Fat Mass was calculated.

Conclusion: Being an inflammatory disease COPD involves with lungs and affect other body tissues like bones and muscles, these are known as co morbidities. Diet and nutritional intake are important in COPD because they help to combat some of these co morbidities. So nutrition is an important therapy in the management of patients with COPD.

Keywords: malnutrition,COPD body mass index, skinfold thickness, calories intake, body surface area.

I. Introduction

From 1950s useful screening tools such as body weight and body mass index have been used to evaluate the nutritional status. Patients who are underweight or losing weight voluntarily associated with severity of airflow obstruction are the poor prognostic sign in chronic obstructive pulmonary disease (COPD). The causes of weight lose in patients with COPD are multifactorial including decreased oral intake as malnutrition, the effect of increased work of breathing due to abnormal respiratory mechanics and the effect of chronic systemic inflammation. Malnutrition can be defined as weight less than 90% of the predicted value as given by the Metropolitan Insurance Company or body mass index (BMI) of less than 18.4 kg/m2.

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The quality of life and survival limitation of chronic obstructive pulmonary disease (COPD) could be due to exercise intolerance and alterations in skeletal muscle like muscle wasting, muscle weakness and muscle fatigue rather than pulmonary problems. (Rob) Patients with COPD are commonly characterized by thin, breathlessness and voluntary weight loss. Long term use of medications such as bronchodilators (malabsorption), Corticosteroids (peripheral myopathy), and antibiotics (Gastrointestinal disturbances) can indirectly affect the nutritional status of COPD patients. (Macklem 2001).Studies have been proved that reduced maximal expiratory flow(Faulkner et al 2006), FEV1 in COPD correlates poorly with exercise capacity (Lencer et al 2003). Hence this study was designed to evaluate the baseline parameters to assess the nutritional status in patients with COPD.

II. Materials and Methods

a) Study population

Ten COPD male patients aged 30-50 yrs with clinically stable were recruited from chest & TB department of Sree Balaji Medical College and hospitals. The study design was explained to the subjects and their informed consent was obtained. The COPD subjects were diagnosed according to the criteria given by Global Initiative for Chronic Obstructive lung Disease (COLD) Patients history like duration of disease, diet intake were obtained by questionnaire. Study was approved by the institutional medical Ethics committee of Sree Balaji Medical College, Chennai.

b) Parameters measured

Body weight (Kg) and height (cm) were measured with subjects wearing indoor clothing and BMI was calculated as by weight and height^2. Pulmonary function test: Flow rates and lung volumes were determined using computerized spirometer (Medispiror). Forced inspiratory and expiratory maneuvers were performed three times and the best values obtained from the maximum inspiratory and expiratory flow-volume curves were used for comparison. Body surface area was calculated in m^2. Skin fold thickness was taken in six sites of the body like biceps, triceps, subscapular, waist, knee and calf muscles by using digital skinfold thickness calipers. With the Skinfold Thickness and Body Surface Area, Total Body Fat was calculated.

c) Statistical analysis

Statistical analysis will be performed by using statistical package for social sciences (SPSS). Data will be expressed as mean ± standard deviation. The correlation between the parameters will be analyzed by using Pearson's moment product correlation analysis. Any p value <0.05 will be considered significant

III. Results

In our results Table-1 showed duration of disease of the study population from 2-40 years and the BMI from 16.90 to 30.37. Only thirty percent of the study population had less than normal BMI. In Table II duration of disease was compared with pulmonary function tests of study population. Values of FEV% and FEF 25-75% proved the obstructive pattern of lung disease and severity of diseases. Moreover as the duration of disease progresses reduction in pulmonary function tests parameters were observed.

a) Results

Characteristic features of study population

Table 1

Subject	Age (yrs)	Sex	Disease Duration	Weight (Kg)	Height(M)	BMI	BSA
1	45	F	20	46	1.65	19.90	1.70
2	40	F	2	57	1.39	29.50	1.57
3	52	M	8	77	1.67	27.61	2.14
4	38	F	2	58	1.5	25.78	1.71
5	47	F	15	47	1.37	25.04	1.42
6	37	F	25	45	1.43	22.01	1.46
7	57	M	2	65	1.6	25.39	1.91
8	65	M	40	46	1.5	20.44	1.55
9	54	M	16	65	1.6	25.39	1.91
10	50	F	5	57	1.37	30.37	1.55

BMI- Body Mass Index, BSA-Body Surface Area

Table 2 : Comparison of duration of disease with pulmonary function tests

Subject	Disease Duration			PFT		
	Years	FEV_1	FVC	FEV_1%	FEF_{50}	FEF_{25-75}
1	20	44	58	76	55	51
2	2	38	47	82	75	77
3	8	41	50	69	55	67
4	2	35	45	70	77	76
5	15	35	49	78	69	57
6	25	35	42	75	51	50
7	2	46	55	84	74	79
8	40	37	47	66	46	47
9	16	47	57	74	58	54
10	5	40	50	79	73	71

PFT- pulmonary function tests, FVC- Forced vital capacity, FEV1- Forced Expiratory volume

Table 3 : Comparison of duration of disease with Nutritional status

Subject	Disease Duration	Cal Intake	Calorie Deficiency	Sum(SFT)	TBF
1	20	1450	850	91.2	3.08
2	2	1165	1135	102.09	8.43
3	8	1400	900	190.1	11.65
4	2	1850	450	102.6	3.77
5	15	1450	850	99.2	2.98
6	25	735	1565	95	2.83

7	2	2045	255	164.33	8.58
8	40	1300	1000	72.3	1.71
9	16	1400	900	189	10.32
10	5	1500	800	159.56	6.66

SFT- Skin Fold Thickness, TBF- Total Body Fat

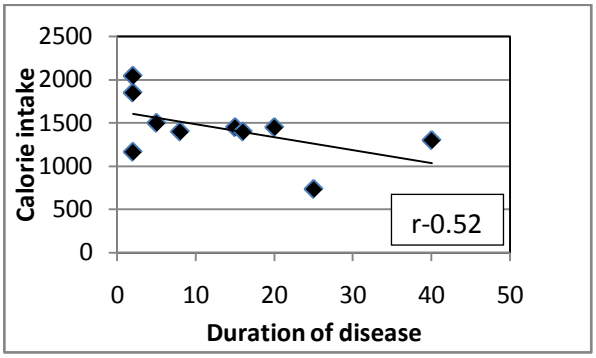


Figure 1

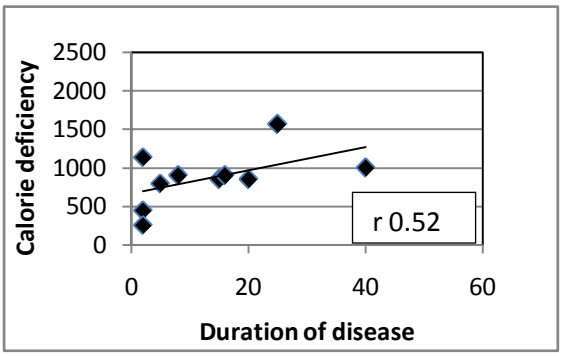
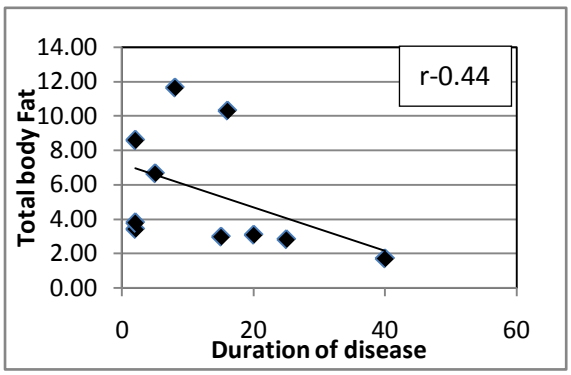


Figure 2



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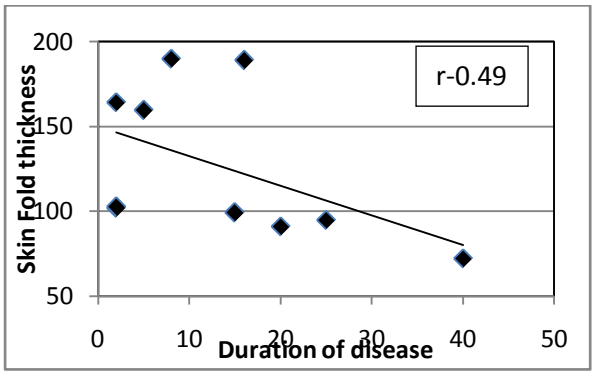

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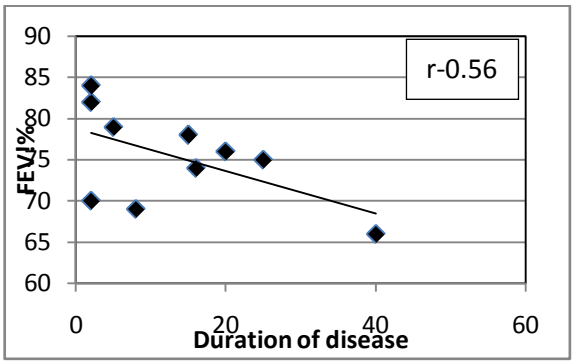

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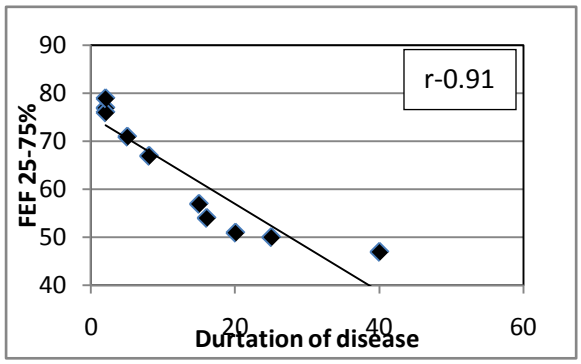

Figure 6

Duration of disease and pulmonary function diaease parameters were negatively correlated which was shown in Fig-V and FIG-VI. Eighty percent of the study population were malnourished based on the calorie intake and calorie deficiency which was focused in Table III. In our study Calorei intake was significantly negatively correlated and calorie deficiency was statistically positively correlated which are shown in Fig-I and Fig-II and also statistically significant. This study showed that both SFT and TBF were very much reduced in all the subjects irrespective of BMI. Our study showed significant negative correlation between duration of disease and SFT, TBF (Fig III, IV).

IV. Discussion

Seventy percent of the COPD patients of our study with mild to severe disease had normal Body weight and BMI, this could be due to depletion of lean tissues (De Benedetto et al 2000).

Recent studies revealed that the regenerative capacity of skeletal muscle is impaired in mice with elevated circulating tumor necrosis factors (TNF) levels

(Langen et al 2006), lower testosterone (Vliet et al 2005), due to chronic hypoxia and corticosteroid therapy (Kamischke et al 1998).

In our study BMI of patients with COPD were negatively correlated with disease duration. This prevalence of malnutrition may be due to systemic inflammation, Low dietary intake (chronic mouth breathing, aerophagia, Dyspnea, old age), bronchodialators, corticosteroids, antibiotics. Elevated circulating leptin level in COPD patients may affects dietary intake and consequently muscle mass and function (Schols 2003).

Expiratory air flow limitation is the key to diagnose the severity of disease and traditional physiological changes in patients with COPD. This could be due to both small and peripheral airway obstruction and consequent increase in airway résistance. Loss of small airway patency due to destruction of alveolar tissues may play important role. Low FEV1 , FEF 25-75% and FEV1% indicate the severity of disease of COPD patients. The airflow obstruction may the increase the cost of breathing (Aliverti and Macklem 2001) which cause structural changes in the respiratory muscles due to the continuous overload (Orozco-Levi et al 2001)

The energy requirements of a healthy person vary depending on a number of factors including: age; gender; body composition; current and past nutritional status; and basal metabolic rate (BMR). BMR may be defined as the metabolic activity required for the maintenance of life including respiration, heartbeat and body temperature.When people experience illness, injury or surgery, their BMR increases. This causes metabolic stress, which, if uncontrolled, can lead to weight loss and eventually malnutrition.Without sufficient energy, protein stores in the body are mobilised from skeletal muscle, resulting in loss of lean body mass. This protein is broken down via biochemical oxidation to meet the body's increased energy needs. If the person's diet does not contain enough protein, this will lead to a negative nitrogen balance (Bongers et al, 2007). A positive nitrogen balance is essential for tissue repair after illness or major trauma (Soeters et al, 2004)

V. Conclusion

Being an inflammatory disease COPD involves with lungs and affect other body tissues like bones and muscles, these are known as co morbidities. Diet and nutritional intake are important in COPD because they help to combat some of these co morbidities. So nutrition is an important therapy in the management of patients with COPD.

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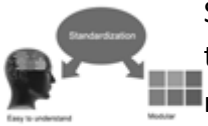

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Standard Usage, Abbreviations, and Units: Spelling and hyphenation should be conventional to The Concise Oxford English Dictionary. Statistics and measurements should at all times be given in figures, e.g. 16 min, except for when the number begins a sentence. When the number does not refer to a unit of measurement it should be spelt in full unless, it is 160 or greater.

Abbreviations supposed to be used carefully. The abbreviated name or expression is supposed to be cited in full at first usage, followed by the conventional abbreviation in parentheses.

Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than 1.4 × 10-3 m3, or 4 mm somewhat than 4 × 10-3 m. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

Structure

All manuscripts submitted to Global Journals Inc. (US), ought to include:

Title: The title page must carry an instructive title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) wherever the work was carried out. The full postal address in addition with the e-mail address of related author must be given. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining and indexing.

Abstract, used in Original Papers and Reviews:

Optimizing Abstract for Search Engines

Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Key Words

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art.A few tips for deciding as strategically as possible about keyword search:

- One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.
- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

The Editorial Board and Global Journals Inc. (US) recommend that, citation of online-published papers and other material should be done via a DOI (digital object identifier). If an author cites anything, which does not have a DOI, they run the risk of the cited material not being noticeable.

The Editorial Board and Global Journals Inc. (US) recommend the use of a tool such as Reference Manager for reference management and formatting.

Tables, Figures and Figure Legends

Tables: Tables should be few in number, cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g. Table 4, a self-explanatory caption and be on a separate sheet. Vertical lines should not be used.

Figures: Figures are supposed to be submitted as separate files. Always take in a citation in the text for each figure using Arabic numbers, e.g. Fig. 4. Artwork must be submitted online in electronic form by e-mailing them.

Preparation of Electronic Figures for Publication

Even though low quality images are sufficient for review purposes, print publication requires high quality images to prevent the final product being blurred or fuzzy. Submit (or e-mail) EPS (line art) or TIFF (halftone/photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Do not use pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings) in relation to the imitation size. Please give the data for figures in black and white or submit a Color Work Agreement Form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution (at final image size) ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs) : >350 dpi; figures containing both halftone and line images: >650 dpi.

Color Charges: It is the rule of the Global Journals Inc. (US) for authors to pay the full cost for the reproduction of their color artwork. Hence, please note that, if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a color work agreement form before your paper can be published.

Figure Legends: Self-explanatory legends of all figures should be incorporated separately under the heading 'Legends to Figures'. In the full-text online edition of the journal, figure legends may possibly be truncated in abbreviated links to the full screen version. Therefore, the first 100 characters of any legend should notify the reader, about the key aspects of the figure.

6. AFTER ACCEPTANCE

Upon approval of a paper for publication, the manuscript will be forwarded to the dean, who is responsible for the publication of the Global Journals Inc. (US).

6.1 Proof Corrections

The corresponding author will receive an e-mail alert containing a link to a website or will be attached. A working e-mail address must therefore be provided for the related author.

Acrobat Reader will be required in order to read this file. This software can be downloaded

(Free of charge) from the following website:

www.adobe.com/products/acrobat/readstep2.html. This will facilitate the file to be opened, read on screen, and printed out in order for any corrections to be added. Further instructions will be sent with the proof.

Proofs must be returned to the dean at dean@globaljournals.org within three days of receipt.

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The Global Journals Inc. (US) are enclosed by our publishing's Early View service. Early View articles are complete full-text articles sent in advance of their publication. Early View articles are absolute and final. They have been completely reviewed, revised and edited for publication, and the authors' final corrections have been incorporated. Because they are in final form, no changes can be made after sending them. The nature of Early View articles means that they do not yet have volume, issue or page numbers, so Early View articles cannot be cited in the conventional way.

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6.4 Author Material Archive Policy

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Before start writing a good quality Computer Science Research Paper, let us first understand what is Computer Science Research Paper? So, Computer Science Research Paper is the paper which is written by professionals or scientists who are associated to Computer Science and Information Technology, or doing research study in these areas. If you are novel to this field then you can consult about this field from your supervisor or guide.

TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

1. Choosing the topic: In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

2. Evaluators are human: First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

3. Think Like Evaluators: If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

5. Ask your Guides: If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

6. Use of computer is recommended: As you are doing research in the field of Computer Science, then this point is quite obvious.

7. Use right software: Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. Use the Internet for help: An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. Use and get big pictures: Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

10. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

11. Revise what you wrote: When you write anything, always read it, summarize it and then finalize it.

12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. Have backups: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. Use of direct quotes: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. Never use online paper: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. Pick a good study spot: To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

Administration Rules Listed Before Submitting Your Research Paper to Global Journals Inc. (US)

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

Criterion for Grading a Research Paper (Compilation) by Global Journals Inc. (US)

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals Inc. (US).

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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