

Original Article

ASSOCIATION BETWEEN MENSTRUAL CYCLE AND INCIDENCE OF PRAMEHA:

A SURVEY BASED CROSS SECTIONAL STUDY

Short Title: Association between Menstrual cycle and Prameha- A survey study

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Abstract: *Prameha*; especially *madhumeha* in ayurveda is correlated with Diabetes Mellitus.

Diabetes in today's era found to have very high prevalence, cause may be the unwholesome diet, lack of physical exercise or the unhealthy lifestyle. Dalhana; in his commentary stated that females are not prone to have prameha as they menstruate every month; and later he himself opposes this statement in a controversial manner hence this study was taken up to validate the

statement 'strinam prameham na bhavati iti' **Aim:** To study the association between incidence of Non-insulin dependent Diabetes Mellitus and menstrual cycle. **Objectives:** 1.To study the incidence of Non-Insulin dependent Diabetes Mellitus in female with special reference to menstrual cycle. 2.To study the incidence of Non-Insulin dependent Diabetes Mellitus in male in same age group.3 To study the association between incidence of Non-Insulin dependent Diabetes mellitus in male and female with reference to menstrual cycle **Methodology:** This is a survey based cross sectional study performed on 200 patients of diabetes, both males and females were included in study. **Observation and results:** It is observed that females also suffer from diabetes but definitely there is some correlation between the menstrual cycle and incidence of Diabetes in females. **Conclusion:** The onset of Diabetes Mellitus is positively associated with menopausal age in females.

Key Words: Menstrual Cycle, Prameha, Diabetes Mellitus, Menopause

INTRODUCTION:

Diabetes is the non-communicable disease. They are of long duration and generally slow progression. Government of India launched a National program for Prevention and Control of Cancer, Diabetes, CVD and Stroke (NPCDCS) to overcome the problem of NCDs. There are four types of non-communicable diseases such as cardiovascular diseases (IHD and stroke), Cancer, Chronic respiratory diseases, and Diabetes Mellitus¹.WHO conducted Global Action Plan for the Prevention and Control of NCDs (2020)².The program focuses on the health

promotion capacity building including human resource development, early diagnosis and management of these diseases with the primary health care system³.

In Ayurveda *Madhumeha* is considered as *Mahagada* and main among *Anushangis* (continuously afflicting *ManastapJanya*).The disease is described in detail in contemporary literature ranging from *Vedic* era to present times; thereby indicating its prevalence in that period⁴.

Aacharya Dalhan in his *NibandhaSangraha* commentary stated that regular menstruating females are not prone to *Prameha*. *Aacharya Dalhan* then opposes the same; in controversial manner. It is necessary to correlate the incidence of menstrual cycle and Non-Insulin Dependent Diabetes Mellitus .These types of references will be the great contribution of Ayurveda in the field of epidemiology⁵.

Menstruation is the visible manifestation of cyclic physiologic uterine bleeding due to shedding of endometrium following invisible interplay of hormones mainly through hypothalamic-pituitary –ovarian axis⁶.

Insulin resistance and hyperinsulinaemia are also associated with regularity and irregularity of menstrual cycle. The mechanism of insulin action on the ovaries leads to hyperinsulinaemia resulting in excessive androgen production leading to menstrual cycle disturbances⁷.

Burden of diabetes across a woman's lifespan: In vitro, estrogens have shown to have metabolic action tissue on skeletal muscles, pancreas, adipose tissue and the central nervous system. Reproductive factor such as age of menarche, age of menopause and cycle irregularity can serve as a proxies' for endogenous estrogen exposure. Earlier age of menarche and later age of menopause have been associated with increased risk of insulin resistance and type2 diabetes⁸.

Gender specific clinical features of diabetes: Women with type2 diabetes could have concurrent features of polycystic ovarian syndrome (oligomenorrhea, hirsutism and infertility) because of shared pathogenesis.

A history of bilateral oophorectomy which would result in a shortened reproductive period, and earlier menopause, have also been associated with less favorable glucose and insulin levels and increased risk of type2 diabetes. Menstrual cycle characteristics such as length and regularity of menstrual cycle characteristics' such as length and regularity of menstrual cycle have also been associated with gestational diabetes and glucose in tolerance⁹.

Post menopausal Diabetes: Data from the woman's health initiative found that both shorter and longer reproductive-duration lengths are associated with increased risk of type2 diabetes¹⁰.

The pre and post Menopausal aspects in Indian women: The transition from premenopausal to postmenopausal status is associated with risk factor for diabetes. In 2011, a scientific correlation study by Kim et al suggestion is that, after taking the age factor out from

the correlation study, there is no association between natural menopause or bilateral oophorectomy and diabetes risk .yet there have been studies suggesting that progesterone is correlated with the development of diabetes Nevertheless, consistent findings from large clinical trial suggest that postmenopausal hormone therapy decreases the risk of developing diabetes mellitus similarly, many studies suggest that postmenopausal hormone therapy has neutral or beneficial effects on glycemic control among women already diagnosed as having diabetes mellitus¹¹.

Diabetes mellitus contributes a major portion of health problem in society. The purpose of this study is to evaluate the association between menstrual period and incidence of Diabetes Mellitus. This will be the best example contributing prevalence of Diabetes Mellitus in Ayurvedic epidemiology.

This study may add one more risk factor in previous risk factors like obesity, poor diet, physical inactivity, family history of Diabetes Mellitus as a part of National Diabetic Control Program.

AIM:

To study the association between incidence of Non-insulin dependent Diabetes Mellitus and menstrual cycle.

OBJECTIVES:

Primary objectives:

- 1) To study the incidence of Non-Insulin dependent Diabetes Mellitus in female with special reference to menstrual cycle.
- 2) To study the incidence of Non-Insulin dependent Diabetes Mellitus in male in same age group.
- 3) To study the association between incidence of Non-Insulin dependent Diabetes mellitus in male and female with reference to menstrual cycle

Secondary objectives:

- 1) To review the literature of Diabetes Mellitus.
- 2) To review the literature of menstrual cycle.
- 3) To review the literature of epidemiology of Diabetes Mellitus.

It is the type of cohort study. It is the one in which the outcomes have all occurred before the start of investigation. In this study data were collected regarding menopausal and diabetic status of population and the results were interpreted.

Methodology

This is a cross-sectional retrospective survey study conducted on 200 subjects. Both males and females, having non-insulin dependent diabetes were included in study. A written consent of all the subjects included in the study in the language best understood by them was taken before enrolling them for the study. A validated questionnaire and a specially designed case record format were used to enroll the patient.

RESEARCH METHODOLOGY**Data collection tool:**

A detailed survey proforma was designed for data collection according to study population.

Institutional ethical committee approved the study .all the participants were explained about the purpose of the study and were ensured strict confidentiality .then verbal informed consent was taken from all the subjects prior to commencement of the study .then by interview technique data collection was done .on an average 5-10 interviews were conducted in a day. The details of questionnaire were provided if required. The survey questions were asked individually to the diagnosed subjects of NIDDM they were told to answer by selecting the best possible option from the options provided after each question. Questions were asked in Hindi or Marathi. The proforma contains following points:

STUDY DESIGN:

Screening of subject



Enrollment of subject



200 Subjects was be recruited for the study



They were briefed about the study protocol



Assessment was done by objective parameters and

Subjective parameters



Statistical analysis with appropriate test



Interpretation



Conclusion

OBSERVATION AND RESULT

In this survey study, 200 subjects of NIDDM were studied and selection of subjects was done by using randomized list as per selection criteria irrespective of socio-economic status.

The questions asked to the subjects were retrospective in nature and the material provided and methods applied were same for female and male subjects.

1. Total number of subjects recruited in the study 200
2. Number of subjects who completed study -200
3. Number of subjects - Female 100, Male- 100

Age: The mean age of diabetic subject were found to be in female subjects 37-66yrs and in male subjects 35-66 yrs and the increased risk of NIDDM is found in age group 51 to 60 years.

Gender: This study includes both Males and females and it is found that both males and females are prone to NIDDM.

Diet: Amongst all the 200 individuals, it is found that the subjects consuming more Non-vegetarian diet suffer more from NIDDM.

Sleep: Sleeping pattern of total subjects had shown that 65.5% subjects had good sleep and 33.5% subjects shown disturbed sleep. 1% patient was suffering from insomnia.

Family history: family history of given subjects showed that maximum subjects i.e. 79.5% had no history of diabetes. 11.5% subjects showed maternal history and 3.5% subjects showed paternal history of DM. some patients shown history of diabetes to their partners (husband or wife).

Addiction: Addiction wise distribution of the subjects showed that, maximum subjects had no addiction i.e.79% among them 33% male and 46% female and 21% subjects were addicted among them 17% male and 4% were female. This may happened because of 50% participated subjects were females.

Emotional stress: Among total subjects 37.5% subjects had emotional stress out of which them 20% subjects were male and 17.5% subjects were female .62.5% subjects had no emotional stress out of which 50% subjects were female and 32.5% were male.

Strotodushti: *Strotodushti* wise distribution of total subjects had shown that maximum no of subjects i.e. 83% shown *Udakwaha Strotodushti* and followed by 82.5% *Mutrawaha Strotus*, 79.5% *Medowaha Strotus*, 79% *Rasawaha Strotus*, 65.5% *Annawaha strotus* , 64.5% *Majjawaha Strotus*, 4.5% *Shukrawaha*, 2.5% *Raktawaha* were *Vikrut* and rest of *Strotus* were shown *Prakrut* in total subjects. 26% subjects which are exclusively females shows *Artawwaha Strotus Dushti*.

Related to Menstrual cycle: In this particular study it is found that there is no relation between Diabetes and Length of Menstrual Cycle, Duration of cycle, Associated pain during cycle, Intermenstrual bleeding, Bleeding pattern in premenopausal phase, Periodicity of cycle, age of

Menarche, Menorrhagia and Oligomenorrhoea; but There is positive association between Diabetes and age of menopause and Diabetes and *Artava-Vikriti*.

Table 01: Table Showing Menopause Status of Diabetic Females and Age of Menopause

Age of menopause	Menopause status of Diabetic females				
	Before	After	At menopause	Total	Total Percent
30 – 35	0	2	0	2	2.82
36 – 40	1	10	0	11	13.414
41 – 45	1	17	1	19	23.170
46 – 50	12	21	3	36	36.82
51 – 55	7	5	0	12	14.63
56 – 60	2	0	0	2	2.43
Total	23	55	4	82	100
Chi2-value	21.2477				
p-value	0.008,HS				

Maximum no of subjects i.e.36% attained menopause in the age group of46-50yr,19% in41-45yr ,12% in51-55yr,2% in 56-60yr,remaining 2% attained menopause in the age group 30-35yr.

The above statistical results were analyzed by applying the chi2test (**21.2477 chi2 value**) in highly significant manner. Since p value in case of all these parameters was found to be 0.008.

Thus it can be observed that there is a strong association between menopausal age and Diabetes Mellitus.

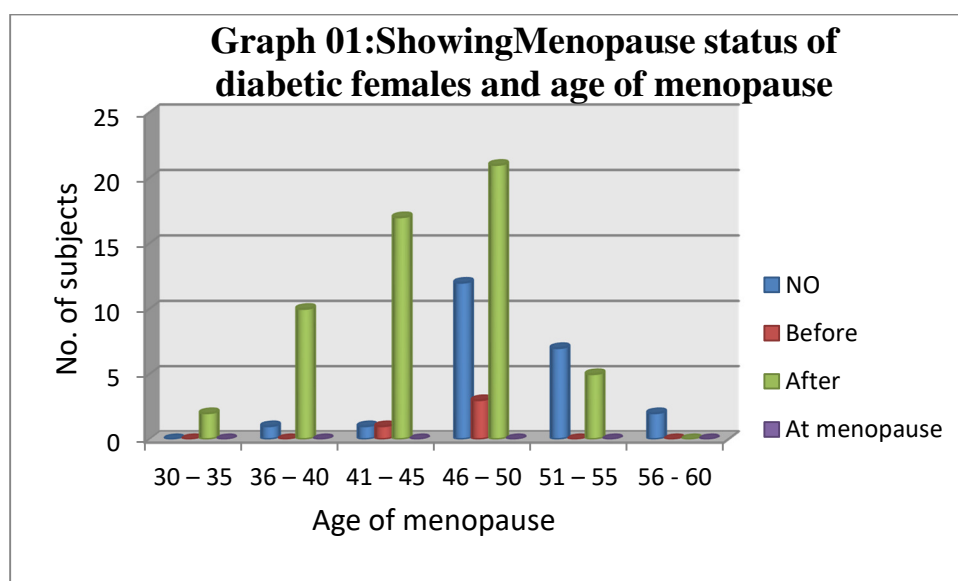


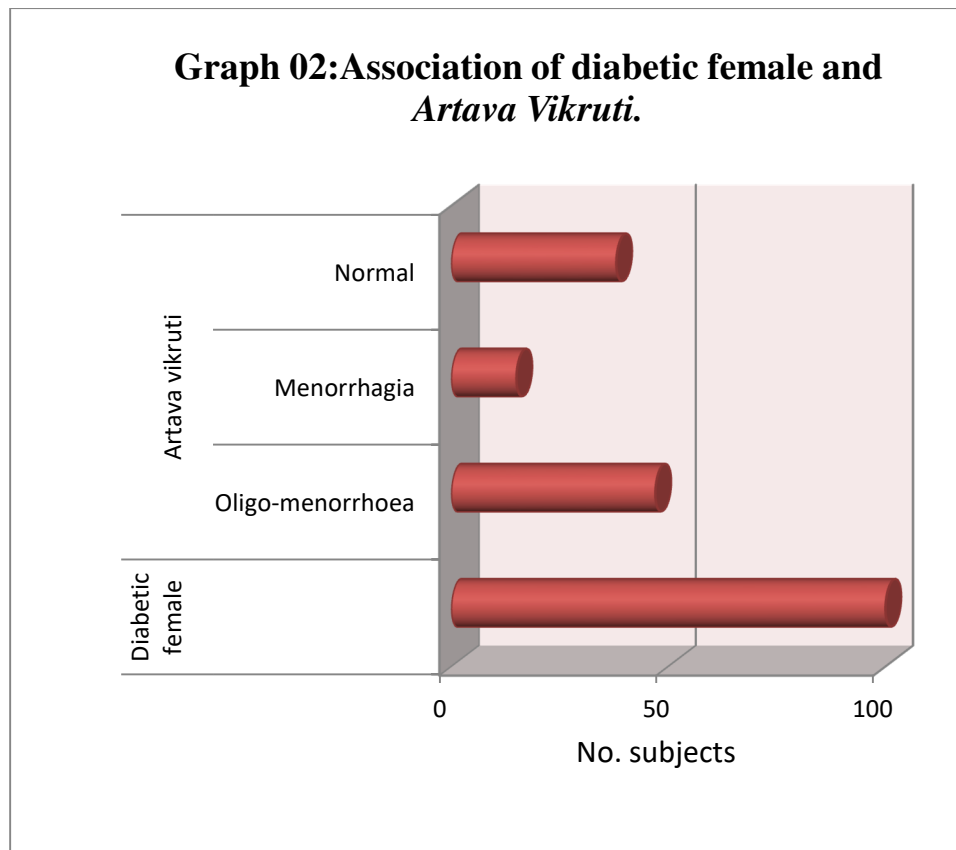
Table 02: Table Showing Association of Diabetic Female and *Artava Vikruti*

Diabetic female	<i>Artava vikruti</i>		
	Oligo-menorrhoea	Menorrhagia	Normal

100	47	15	38
	47%	15%	38%
p-value	0.001,HS		

Above table shows that *Artav Vikruti* was found in 62% female subjects and *Artav Vikruti* was not found in 38% female subjects.

The above statistical results were analyzed by applying the chi2test (**21.2477 chi2 value**) in highly significant manner. Since p value in case of all these parameters was found to be 0.001. Thus it can be observed that there is strong association between *Artav Vikruti* and Diabetes Mellitus.



This observational (Retrospective survey) study was planned, keeping in view the aim to study the association between Incidence of Non-Insulin Dependent Diabetes Mellitus in Females and Menstrual Cycle and comparison of age of onset of Diabetes Mellitus in between male and female subjects with *Ayurvedic* prospective. Detailed information with proper written consent was drawn using a questionnaire (discussed before) 200 subjects of same age group among them 100 were female and 100 were male, selected purposefully for the study one to one interview was carried out and data was collected.

The present study is mile stone, *Aacharya Dalhan* in his *NibandhaSangraha* commentary commented on other *Aacharyas* opinion that regular menstruating females are not prone to *Prameha*. *Aacharya Dalhan* then opposes the same; in controversial manner .It is necessary to correlate the incidence of menstrual cycle and Non-Insulin Dependent Diabetes Mellitus These types of references will be the great contribution of Ayurveda in the field of epidemiology (12)

After a subtle analysis of the data collected through a uniform proforma questionnaire, very interesting findings came to fore.

Discussion on Principle Findings:

A. Data related to Demography

B. Data related to Personal History

C. Data related to association of Diabetes and Menstrual cycle.

A] Discussion on Demographic Data

Analysis according to Age:

Age - In this study, it was observed that maximum number of subjects i.e. 66.5% subjects belonging to age group 51-60yrs and 23% subjects belonging to age group 41-50yrs and 6% subjects belonging to age group 31-40yrs the rest of them i.e. 4.5% were between the age group of 61-70yrs. The mean age of diabetic subjects were found to be in female subjects 37-66yrs and in male subjects 35-66yrs.

The subjects in age group 51-60yrs have impaired glucose regulation which means increased risk of Diabetes Mellitus due to insulin resistance insulin secretion may be severely reduced

At this particular age dietetic incompatibilities like *Vishmashana* (Irregular timing of food article) Ignorance about *Dincharya* (Daily regimen), *Avyayama* (Lack of exercise) are the leading cause of Diabetes Mellitus¹³

Analysis according to Gender:

Gender wise distribution shown that among total subjects 50% subjects was female and 50% subjects were male. As 100 females and 100 males are taken as sample.

Gender wise distribution is almost comparable as sample taken is same in both genders.

B) Data related to Personal History:**Analysis according to diet Patteren:**

Dietetic habits – Dietetic habits of 200 subjects had shown that 44.5% subjects were taken vegetarian diet. 55.5% were taken mixed diet.

Mixed diet taking subjects are more as compaired to subjects taking vegetarian diet. We analyzed that nonvegetarian diet is *Guru*, difficult to digest and especially *Anup Mans* is *Madhur Kaphprakopak* and *Kledjanaka* which is the cause of Diabetes Mellitus.

Analysis according to Water Intake:

Water Intake : Table shown that maximum no of subjects i.e.50% of subjects taken 2-3lit of water per day, 23% subjects 3-4lit, 21% subjects 1-2lit, 6% subjects > 4lit accordingly.

As per Kaiyadev *Nighantu* water is *Ahitkar* in *Prameha* (Diabetes Mellitus) because it's *Abhishyandi* and shit which increases *Kleda* in body and hampered *Agni* then thereby disturbs body metabolism¹⁴

Analysis according to Family History:

Family history: family history of given subjects showed that maximum subjects i.e. 79.5% had no history of diabetes. 11.5% subjects showed maternal history and 3.5% subjects showed

paternal history of DM o some patients shown history of diabetes to their partners (husband or wife).

Positive family history of subjects suggestive of hereditary background also spouse's history of Diabetes Mellitus suggestive of life style (*Dincharya*) due to same dietary pattern i.e. "*Prameho anushanginam*"¹⁴,

Analysis according to Bowel habit

Bowel habit: bowel habits of the subjects showed that 70% patient had regular bowel habit and 30% patient had irregular bowel habit.

The above statistical results were analyzed by applying the chi2test (**4.2595**) in significant manner. Since p value in case of all these parameters was found to be less than 0.044. Thus we can be observed that diabetic patients have significant regular bowel habits.

Irrespective bowel habits both subjects that is subject having regular bowel habit and subjects having irregular bowel habits both have DM

Analysis according to Addiction:

Addiction - Addiction wise distribution of the subjects showed that, maximum subjects had no addiction i.e.79% among them 33% male and 46% female and 21% subjects were addicted among them 17% male and 4% were female. This may happened because of 50% participated subjects were females.

The above statistical results were analyzed by applying the chi2test (**19.5179 chi2 value**) in highly significant manner. Since p value in case of all these parameters was found to be more than 0.001. Thus it can be observed that diabetic subjects have strong association with addiction, and addiction is significantly found in diabetic males.

Addictions have strong positive association with the incidence of DM.

Most of the Addicted subjects were male, as per the Indian trend, generally male get addicted more than females

The addiction that is found most is a tobacco addiction. Nicotine consumption is directly related to Insulin resistance¹³.

Hence there is highly significant correlation of addiction and Incidence of DM.

Analysis according to Emotional stress and its association with DM:

Emotional stress: Among total subjects 37.5% subjects had emotional stress out of which them 20% subjects were male and 17.5% subjects were female .62.5% subjects had no emotional stress out of which 50% subjects were female and 32.5% were male.

The above statistical results were analyzed by applying the chi2test (**0.6815 chi2 value**) in non-significant manner. Since p value in case of all these parameters was found to be 0.464. Thus we can be observed that there is no association between Diabetes mellitus and emotional stress.

It is proven that stress has strong positive correlation with incidence of DM. Middle to old age is the period in life in which subjects were exposed to stress which causes imbalance in hormonal and nervous regulation of body; but in this particular study it is seen non-significant as the mean age group of the subjects do not face much mental stress hence most of the subject do not have mental stress Also occupation of these subjects mostly causes physical stress not mental. Physical exertion increases glucose uptake and lowers insulin resistance.

Analysis according to *Strotodushti*:

Strotodushti: *Strotodushti*wise distribution of total subjects had shown that maximum no of subjects i.e. 83% shown *Udakwaha Strotodushti* and followed by 82.5% *Mutrawaha Strotus*, 79.5% *Medowaha Strotus*, 79% *Rasawaha Strotus*, 65.5% *Annawaha Strotus*, 64.5% *Majjawaha Strotus*, 4.5% *Shukrawaha Strotus*, 2.5% *Raktawaha Strotas* were vitiated and rest of *Strotas* were shown *Prakrut* in total subjects, 26% subjects which are exclusively females shows *Artava-waha Strotus Dushti*.

C) Data related to association of Diabetes and Menstrual cycle.

Non- significant p value shows that there is no association between duration menstrual cycle and Diabetes Mellitus.

Analysis according to Association between Duration of diabetes and Menopause status of Diabetic females

In maximum no of female subjects i.e.55% onset of Diabetes mellitus after menopause, in 23% before menopause, 6% at menopause and 18% female had not yet attained menopause.

The above statistical results were analyzed by applying the chi2test (**29.6218 chi2 value**) in highly significant manner. Since p value in case of all these parameters was found to be 0.002. Thus we can be observed that there is highly significant association between Diabetes mellitus and menopause in females. Above results shown that female subjects have Diabetes Mellitus after menopause. (Table 01) (Graph 01)

NibandhaSangraha commentary commented on other *Aacharyas* opinion that regular menstruating females are not prone to *Prameha*. *Aacharya Dalhan* then opposes the same; in controversial manner¹⁵. Insulin exhibited minor menstrual cycle variability.

Analysis according to association of menopause and onset of DM:

Estradiol and progesterone were positively associated with insulin resistance and should be considered in studies of insulin resistance among premenopausal women because of increased insulin resistance diabetes occur after menopause¹⁶.

Periodicity of Menstrual Cycle:

Regularity of menstrual cycles is considered an indicator of women's reproductive health; changes in the menstrual cycle have different reasons and are often attributed to ovaries-thyroid and pituitary axis dysfunctions. In previous studies reported that Irregular menstrual cycle is one

of the components of PCOS, may be associated with DM2 Population- based studies have also indicated the increased prevalence of DM2 and CVDs in women with irregular cycles¹⁷.

In this specific study most of patients having oligomenorrhea but not giving the proper history of periodicity of menstrual cycle. Because of which results were different.

Analysis according to Age of Menopause

Maximum no of subjects i.e.43.90% attained menopause in the age group of46-50yr,23.17% in41-45yr ,4.65% in51-55yr,2.43% in 56-60yr,remaining 2.43% attained menopause in the age group 30-35yr.

The above statistical results were analyzed by applying the chi2test (**21.2477 chi2 value**) in highly significant manner. Since p value in case of all these parameters was found to be 0.008.

Thus it can be observed that there is strong association between menopausal age and Diabetes Mellitus.

Estradiol and progesterone were positively associated with insulin resistance and should be considered in studies of insulin resistance among premenopausal women because of increased insulin resistance diabetes occur after menopause¹⁸

Analysis according to *Artav Vikruti* and Diabetes Mellitus:

Above table shows that *Artav Vikruti* was found in62% female subjects and *Artav Vikruti* was not found in 38% female subjects. (Table 10) (Graph 03)

The above statistical results were analyzed by applying the chi2test (**21.2477 chi2 value**) in highly significant manner. Since p value in case of all these parameters was found to be 0.001.

Thus we can be observed that there is association between *Artav Vikruti* and Diabetes Mellitus.

Menstruation according to *Ayurveda*, is ultimate *Shodhan*¹⁹ i.e. Physiological (natural) detoxification process which is carried out monthly by means of which the excess quantity of *Doshas* (vitiating *Doshas*) are excreted out that's why *Doshas* do not undergo *Prasar Awastha* and *Samprapti* do not proceed further and *Vyadhi vyakti* delays. (Table 02) (Graph 02)

Analysis according to association of Diabetes and oligomenorrhea:

Oligomenorrhea is a condition in which there is minimal amount of menstrual flow that means *Doshas* are saturated in body physiological detoxification not occur and in Menorrhagia excess amount of menstrual flow occur because of the disturbances in menstrual flow vitiation of *Doshas* occur and *Samprapti of Prameha* carried out.

It has been shown that 87% of women with irregular menstrual cycles suffer from the polycystic ovary syndrome (PCOS); long menstrual cycles or oligomenorrhea (>35 days), often seen in PCOS women, are a result of ovarian dysfunction and insulin resistance An increased risk for diabetes type 2 (DM 2) in women with PCOS has been²⁰.

Further scope for the study:

- 1) Study can be extended further with two female groups one is Diabetic and other is non Diabetic
- 2) There is huge scope for experimental study with appropriate assessment criteria like hormonal assay.

CONCLUSION

- 1) The Study revealed, age group from 51 to 60 years is more prone to DM in both gender.
- 2) The *Artawa Vikrutis* i.e. oligomenorrhea and Menorrhagia are strongly associated with Diabetes Mellitus.
- 3) The onset of Diabetes Mellitus is positively associated with menopausal age in females.
- 4) The age of menarche, menstrual cycle length, phases of menstrual cycle are not much associated with Diabetes Mellitus.
- 5) Consumption of *Guru, Snigdha, Abhishyandi* and Non-vegetarian diet in excessive quantity and excess drinking of water can lead to the development of Diabetes Mellitus.
- 6) Disturbed and irregular sleep pattern leads to Diabetes Mellitus.
- 7) *Udakvaha, Mutravaha, Medovaha, Rasavaha, Majjavaha* and *Aartavavaha srotas* are more vitiated (Than Others *Strotasas*) in female Diabetes Mellitus.

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