RESULTS

The present study “Effects of exercise rehabilitation programme on osteoarthritic knee with special reference to biochemical changes” aimed at finding prevalence of diabetes and obesity in the patients of osteoarthritis knee, to study the effects of quadriceps strength, range of motion, cardiovascular fitness and functional status in osteoarthritis knee patients and to find effects of exercise rehabilitation programme on patients of osteoarthritis knee with special reference to biochemical changes.

200 patients of established osteoarthritis of knee ranging in age from 40-65 years were included in the study. Patients with a history of condition known to preclude exercise were excluded from the study. Such conditions include coronary heart disease, myocardial infarction, unstable angina, chronic bronchitis, emphysema, peripheral vascular disease, thrombophlebitis, embolism, kidney failure and uncontrolled hypertension etc. The patients were explained the study protocol and written consent was taken from them before the start of study programme.

Patients were randomly divided into two groups: Group A (Experimental Control Group) and Group B (Experimental Patient Group).
**Group A: Experimental Control Group (ECG)**

100 patients (Males n= 30, Females n= 70) were included in group A, who were applied conventional physiotherapy programme for two months. The frequency of application was 5 days in a week.

**Group B: Experimental Patient Group (EPG)**

100 patients (Males n= 32, Females n= 68) were included in group B, who were applied exercise rehabilitation programme along with conventional physiotherapy programme for two months. The frequency of application was 5 days in a week.

In order to make the groups more homogeneous, they were further subdivided into males and females. The experimental control group was given conventional physiotherapy programme whereas experimental patient group was given exercise rehabilitation programme along with conventional physiotherapy programme.

Conventional physiotherapy programme included application of hot packs, isometric exercises, range of motion exercises, stretching exercises, joint mobilization exercises and progressive resisted exercises.

For exercise rehabilitation programme along with conventional physiotherapy programme, mild intensity and long duration aerobic conditioning exercises (at 60% of MHR) were applied to the whole body (including upper limbs). Treatment programme started with the application of hot packs to the knee joints.
Aerobic conditioning exercises: Aerobic warm up was given for 5-10 minutes. It included swinging of arms and legs (upwards, sideways, backwards and laterally). Walking was given for 5-10 minutes and cycling was given for 15-20 minutes (at 60% of MHR), 5 times a week. Aerobic exercises were followed by cool down exercises for 5-10 mins.

A thorough evaluation of the patients physical characteristics (age, weight, height and body mass index); clinical health status (pulse rate, heart rate, blood pressure-systolic and blood pressure-diastolic); health related fitness (pain, range of motion, strength-isometric, strength-isotonic, cardiovascular fitness and functional status); physiological parameters (haemoglobin, erythrocyte sedimentation rate) and biochemical parameters (fasting blood glucose, serum cholesterol, serum triglyceride, serum high density lipoprotein-cholesterol and serum uric acid) were done before the start of study programme, after one month of the study programme and after completion of two months of study programme.

The values of physical characteristics, clinical health status, health related fitness, physiological and biochemical parameters were recorded in the data sheets. Standard statistical tests were used with the help of Microsoft Excel and SPSS software.
PREVALENCE OF OSTEOARTHRITIS KNEE IN DIFFERENT AGE GROUPS

Table 1 shows prevalence of osteoarthritis knee in different age groups. Different age groups 40-50 years, 51-60 years and > 60 years were taken. Their frequencies were recorded as 31, 92 and 77 with percentage 15.5%, 46% and 38.5% respectively.

PREVALENCE OF OSTEOARTHRITIS KNEE IN MALES AND FEMALES

Table 2 shows prevalence of osteoarthritis knee in different sex groups of males and females. The frequencies were recorded as 62 in males and 138 in females with percentage 31% and 69% respectively.

PREVALENCE OF DIABETES MELLITUS IN PATIENTS OF OSTEOARTHRITIS KNEE

Table 3 shows prevalence of diabetes mellitus in osteoarthritis knee patients. Different levels of fasting blood glucose like 80-100 mg%, 100-120 mg%, 120-140 mg% and above 140 mg% were taken. The patients of osteoarthritis knee were further subdivided into males and females groups. The frequency in males was recorded as 8, 31, 16 and 7 with percentage of 12.9%, 50%, 25.8% and 11.3% respectively. The frequency in females was recorded as 16, 63, 42 and 17 with percentage of 11.6%, 45.7%, 30.4% and 12.3% respectively.
PREVALENCE OF OBESITY IN PATIENTS OF OSTEOARTHRITIS KNEE

Table 4 shows prevalence of obesity in osteoarthritis knee patients. Different levels of Body Mass Index (in Kgs/m$^2$) were classified into following groups like below 18.5 Kgs/m$^2$, 18.5-24.9 Kgs/m$^2$, 25-29.9 Kgs/m$^2$, 30-39.9 Kgs/m$^2$ and above 40 Kgs/m$^2$. The frequency in males was recorded as 2, 8, 16, 24, and 12 with percentage 3.2%, 12.9%, 25.8%, 38.7% and 19.4% respectively. The frequency in females was recorded as 4, 12, 42, 48 and 32 with percentage 2.9%, 8.7%, 30.4%, 34.8% and 23.2% respectively.

PHYSICAL CHARACTERISTICS

Table 5 shows mean values of physical characteristics of males belonging to experimental control group (ECG) and experimental patient group (EPG) of osteoarthritis knee patients at 0 month, after 1 month and after 2 months. The mean ± S.D. of age recorded in experimental control group was 54.73 ± 6.77 year and in experimental patient group was 53.47 ± 6.54. The mean ± S.D. of height recorded in experimental control group was 1.62 ± 0.06 meter and in experimental patient group was 1.61 ± 0.07 meter.

The mean ± S.D. of weight at 0 month, after 1 month and after 2 months in experimental control group were 71.17 ± 6.72, 69.27 ± 6.51 and 67.63 ± 6.79 kg respectively and in experimental
patient group were 71.81 ± 6.62, 67.22 ± 6.64 and 63.0 ± 7.07 kg respectively. The mean ± S.D. of body mass index (BMI) at 0 month, after 1 month and after 2 months in experimental control group were 27.22 ± 2.84, 26.51 ± 2.85 and 25.85 ± 2.63 kg/m² respectively and in experimental patient group were 27.65 ± 2.47, 25.88 ± 2.48 and 24.24 ± 2.49 kg/m² respectively.

Table 6 shows t values (p<0.05) of physical characteristics of males belonging to experimental control group and experimental patient group of osteoarthritis knee patients at different time intervals. The mean values of weight of experimental control group and experimental patient group of osteoarthritis knee patients when compared statistically after regular intervals were found significant after 1 month and after 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.

The mean values of BMI when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.

Table 7 shows mean values of physical characteristics of females belonging to experimental control group and experimental patient group of osteoarthritis knee patients at 0 month, after 1
month and after 2 months. The mean ± S.D. of age recorded in experimental control group was 58.14 ± 5.40 year and in experimental patient group was 57.40 ± 5.47 year. The mean ± S.D. of height recorded in experimental control group was 1.59 ± 0.06 meter and in experimental patient group was 1.58 ± 0.07 meter.

The mean ± S.D. of weight at 0 month, after 1 month and after 2 months in experimental control group were 70.66 ± 6.74, 67.63 ± 6.63 and 65.50 ± 6.56 kg respectively and in experimental patient group were 73.24 ± 6.32, 67.68 ± 6.25 and 63.37 ± 6.15 kg respectively. The mean ± S.D. of body mass index (BMI) at 0 month, after 1 month and after 2 months in experimental control group were 27.91 ± 2.74, 26.70 ± 2.58 and 25.83 ± 2.13 kg/m² respectively and in experimental patient group were 28.06 ± 3.33, 25.92 ± 3.08 and 24.26 ± 2.91 kg/m² respectively.

Table 8 shows t values (p<0.05) of physical characteristics of females belonging to experimental control group and experimental patient group of osteoarthritis knee patients at different time intervals. The mean values of weight of experimental control group and experimental patient group of osteoarthritis knee patients when compared statistically after regular intervals were found statistically significant after 1 month and after 2 months of exercise.
rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 0 and 2 months of EPG, after 2 months of ECG Vs 0, 1 and 2 months of EPG.

The mean values of BMI when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 0 month and 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.

**CLINICAL HEALTH STATUS**

Table 9 shows mean values of clinical health status of males belonging to experimental control group and experimental patient group of osteoarthritis knee patients at 0 month, after 1 month and after 2 months. The mean ± S.D. of pulse rate recorded in experimental control group at 0 month, after 1 month and after 2 months were 67.80 ± 4.97, 66.07 ± 6.14 and 64.37 ± 5.17 respectively and in experimental patient group were 66.63 ± 6.33, 63.56 ± 5.64 and 60.38 ± 4.58 respectively.

The mean ± S.D. of heart rate recorded in experimental control group at 0 month, after 1 month and after 2 months were 69.40 ± 5.39, 68.50 ± 6.09 and 66.07 ± 5.49 respectively and in experimental patient group were 68.59 ± 6.35, 66.63 ± 6.33 and 62.31 ± 5.26 respectively.
The mean ± S.D. of blood pressure (systolic) at 0 month, after 1 month and after 2 months in experimental control group were 151.4 ± 6.75, 146.40 ± 7.65 and 137.33 ± 7.70 mm Hg respectively and in experimental patient group were 154 ± 13.2, 152.31 ± 12.85 and 145.37 ± 13.13 mm Hg respectively.

The mean ± S.D. of blood pressure (diastolic) at 0 month, after 1 month and after 2 months in experimental control group were 86.90 ± 1.91, 85.8 ± 1.92 and 85.20 ± 2.76 mm Hg respectively and in experimental patient group were 87.4 ± 2.28, 83.88 ± 1.83 and 81.5 ± 1.97 mm Hg respectively.

Table 10 shows t values (p<0.05) of clinical health status of males belonging to experimental control group and experimental patient group of osteoarthritis knee patients at different time intervals. The mean values of pulse rate of experimental control group and experimental patient group of osteoarthritis knee patients when compared statistically after regular intervals were found significant after 1 month and after 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 1 and 2 months of EPG, after 2 months of ECG Vs 2 months of EPG.

The mean values of heart rate when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG
Vs 2 months of EPG, after 1 month of ECG Vs 1 and 2 months of EPG, after 2 months of ECG Vs 2 months of EPG.

The mean values of blood pressure (systolic) when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 2 months of EPG, after 1 month of ECG Vs 0 and 1 months of EPG, after 2 months of ECG Vs 0, 1 and 2 months of EPG.

The mean values of blood pressure (diastolic) when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 0, 1 and 2 months of EPG, after 2 months of ECG Vs 0, 1 and 2 months of EPG.

Table 11 shows mean values of clinical health status of females belonging to experimental control group and experimental patient group of osteoarthritis knee patients at 0 month, after 1 month and after 2 months. The mean ± S.D. of pulse rate recorded in experimental control group at 0 month, after 1 month and after 2 months was 69.03 ± 9.50, 72.69 ± 9.69 and 68.53 ± 9.05 respectively and in experimental patient group was 72.62 ± 9.83, 68.97 ± 9.63 and 64.04 ± 8.09 respectively.
The mean ± S.D. of heart rate recorded in experimental control group at 0 month, after 1 month and after 2 months were 69.64 ± 9.43, 71.57 ± 9.24 and 68.73 ± 9.08 respectively and in experimental patient group were 69.37 ± 9.79, 67.89 ± 9.79 and 64.37 ± 9.79 respectively.

The mean ± S.D. of blood pressure (systolic) at 0 month, after 1 month and after 2 months in experimental control group were 147 ± 9.79, 145.74 ± 8.71 and 140.34 ± 8.09 mm Hg respectively and in experimental patient group were 155 ± 13.11, 150.47 ± 12.74 and 146.44 ± 13.14 mm Hg respectively.

The mean ± S.D. of blood pressure (diastolic) at 0 month, after 1 month and after 2 months in experimental control group were 86.09 ± 2.77, 86.0 ± 2.64 and 85.43 ± 2.73 mm Hg respectively and in experimental patient group were 87.53 ± 2.29, 83.91 ± 1.88 and 81.5 ± 2.03 mm Hg respectively.

Table 12 shows t values (p<0.05) of clinical health status of females belonging to experimental control group and experimental patient group of osteoarthritis knee patients at different time intervals. The mean values of pulse rate of experimental control group and experimental patient group of osteoarthritis knee patients when compared statistically after regular intervals were found significant after 1 month and after 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 2 months of
EPG, after 1 month of ECG Vs 1 and 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.

The mean values of heart rate when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 2 months of EPG, after 1 month of ECG Vs 1 and 2 months of EPG, after 2 months of ECG Vs 2 months of EPG.

The mean values of blood pressure (systolic) when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 2 months of EPG, after 1 month of ECG Vs 0 and 1 months of EPG, after 2 months of ECG Vs 0, 1 and 2 months of EPG.

The mean values of blood pressure (diastolic) when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 0, 1 and 2 months of EPG, after 2 months of ECG Vs 0, 1 and 2 months of EPG.

**HEALTH RELATED FITNESS**

Table 13 shows mean values of health related fitness of males belonging to experimental control group and experimental patient group of osteoarthritis knee patients at 0 month, after 1 month and
after 2 months. The mean ± S.D. of pain recorded in experimental control group at 0 month, after 1 month and after 2 months were 6.67 ± 1.52, 5.53 ± 1.31 and 5.53 ± 1.31 respectively and in experimental patient group were 6.81 ± 1.69, 4.28 ± 1.11 and 2.63 ± 0.83 respectively.

The mean ± S.D. of range of motion at 0 month, after 1 month and after 2 months recorded in experimental control group were 85.23 ± 12.5, 93.57 ± 12.55 and 104.80 ± 14.54 respectively and in experimental patient group were 83.56 ± 13.29, 103.44 ± 14.39, 120.19 ± 9.88 respectively.

The mean ± S.D. of strength (isometric) at 0 month, after 1 month and after 2 months in experimental control group were 250.83 ± 45.94, 338.50 ± 44.20 and 478.50 ± 44.20 respectively and in experimental patient group were 252.19 ± 43.81, 382.19 ± 43.81 and 532.19 ± 43.81 respectively.

The mean ± S.D. of strength (isotonic) at 0 month, after 1 month and after 2 months in experimental control group were 1.80 ± 0.87, 2.47 ± 0.86 and 3.63 ± 1.03 respectively and in experimental patient group were 1.84 ± 0.86, 2.84 ± 0.88 and 4.13 ± 0.87 respectively.

The mean ± S.D. of cardiovascular fitness at 0 month, after 1 month and after 2 months in experimental control group were 2.63 ± 0.49, 2.76 ± 0.43 and 2.83 ± 0.38 respectively and in
experimental patient group were 2.53 ± 0.50, 1.75 ± 0.44 and 1.06 ± 0.25 respectively.

The mean ± S.D. of functional status at 0 month, after 1 month and after 2 months in experimental control group were 3.40 ± 0.33, 2.49 ± 0.35 and 1.39 ± 0.35 respectively and in experimental patient group were 3.35 ± 0.37, 2.05 ± 0.38 and 0.85 ± 0.38 respectively.

Table 14 shows t values (p<0.05) of health related fitness of males belonging to experimental control group and experimental patient group of osteoarthritis knee patients at different time intervals. The mean values of pain as recorded for experimental control group and experimental patient group of osteoarthritis knee patients when compared statistically after regular intervals were found significant after 1 month and after 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 0, 1 and 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.

The mean values of range of motion when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 0, 1 and 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.
The mean values of strength (isometric) when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 0, 1 and 2 months of EPG, after 2 months of ECG Vs 0, 1 and 2 months of EPG.

The mean values of strength (isotonic) when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 0, 1 and 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.

The mean values of cardiovascular fitness when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 1 and 2 months of EPG, after 2 months of ECG Vs 0, 1 and 2 months of EPG.

The mean values of functional status when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 0, 1 and 2 months of EPG, after 2 months of ECG Vs 0, 1 and 2 months of EPG.
Table 15 shows mean values of health related fitness of females belonging to experimental control group and experimental patient group of osteoarthritis knee patients at 0 month, after 1 month and after 2 months. The mean ± S.D. of pain recorded in experimental control group at 0 month, after 1 month and after 2 months were 7.21 ± 1.26, 5.66 ± 1.09 and 4.23 ± 1.21 respectively and in experimental patient group were 7.02 ± 1.25, 4.35 ± 0.86 and 3.0 ± 0.69 respectively.

The mean ± S.D. of range of motion recorded at 0 month, after 1 month and after 2 months in experimental control group were 85.90 ± 13.56, 93.83 ± 13.13 and 109.83 ± 12.62 respectively and in experimental patient group were 85.28 ± 13.05, 103.87 ± 14.25, 122.49 ± 12.27 respectively.

The mean ± S.D. of strength (isometric) at 0 month, after 1 month and after 2 months in experimental control group were 256.79 ± 49.73, 342.43 ± 49.46 and 484.43 ± 49.38 respectively and in experimental patient group were 250.81 ± 50.19, 380.81 ± 50.19 and 530.81 ± 50.19 respectively.

The mean ± S.D. of strength (isotonic) at 0 month, after 1 month and after 2 months in experimental control group were 1.86 ± 0.81, 2.24 ± 0.77 and 2.62 ± 0.92 respectively and in experimental patient group were 1.87 ± 0.81, 2.90 ± 0.78 and 4.06 ± 0.79 respectively.
The mean ± S.D. of cardiovascular fitness at 0 month, after 1 month and after 2 months in experimental control group were 2.53 ± 0.50, 2.64 ± 0.48 and 2.76 ± 0.43 respectively and in experimental patient group were 2.60 ± 0.49, 1.69 ± 0.47 and 1.02 ± 0.12 respectively.

The mean ± S.D. of functional status at 0 month, after 1 month and after 2 months in experimental control group were 3.35 ± 0.37, 2.46 ± 0.36 and 1.36 ± 0.36 respectively and in experimental patient group were 3.36 ± 0.35, 2.07 ± 0.35 and 0.87 ± 0.35 respectively.

Table 16 shows t values (p<0.05) of health related fitness of females belonging to experimental control group and experimental patient group of osteoarthritis knee patients at different time intervals. The mean values of pain as recorded for experimental control group and experimental patient group of osteoarthritis knee patients when compared statistically after regular intervals were found significant after 1 month and after 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 0, 1 and 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.

The mean values of range of motion when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0
The mean values of strength (isometric) when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 0, 1 and 2 months of EPG, after 2 months of ECG Vs 0, 1 and 2 months of EPG.

The mean values of strength (isotonic) when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 0, 1 and 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.

The mean values of cardiovascular fitness when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 1 and 2 months of EPG, after 2 months of ECG Vs 0, 1 and 2 months of EPG.

The mean values of functional status when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0
month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 0, 1 and 2 months of EPG, after 2 months of ECG Vs 0, 1 and 2 months of EPG.

**PHYSIOLOGICAL PARAMETERS**

Table 17 shows mean values of physiological parameters of males belonging to experimental control group and experimental patient group of osteoarthritis knee patients at 0 month, after 1 month and after 2 months. The mean ± S.D. of haemoglobin recorded in experimental control group at 0 month, after 1 month and after 2 months were 9.26 ± 2.17, 9.08 ± 1.93 and 8.89 ± 1.64 g% respectively and in experimental patient group were 9.23 ± 3.09, 9.93 ± 3.09 and 11.20 ± 2.75 g% respectively.

The mean ± S.D. of erythrocyte sedimentation rate recorded at 0 month, after 1 month and after 2 months in experimental control group were 13.10 ± 2.97, 13.36 ± 2.89 and 13.84 ± 2.62 mm/Hr respectively and in experimental patient group were 14.29 ± 3.40, 13.79 ± 3.39, 12.99 ± 3.39 mm/Hr respectively.

Table 18 shows t values (p<0.05) of physiological parameters of males belonging to experimental control group and experimental patient group of osteoarthritis knee patients at different time intervals. The mean values of haemoglobin as recorded for experimental control group and experimental patient group of osteoarthritis knee patients when compared statistically after
regular intervals were found significant after 1 month and after 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 2 months of EPG, after 1 month of ECG Vs 2 months of EPG, after 2 months of ECG Vs 2 months of EPG.

The mean values of erythrocyte sedimentation rate when compared statistically between the groups does not showed significant results after 1 month and 2 months of exercise rehabilitation programme.

Table 19 shows mean values of physiological parameters of females belonging to experimental control group and experimental patient group of osteoarthritis knee patients at 0 month, after 1 month and after 2 months. The mean ± S.D. of haemoglobin recorded in experimental control group at 0 month, after 1 month and after 2 months were 8.65 ± 2.42, 8.48 ± 2.19 and 8.08 ± 2.19 g% respectively and in experimental patient group were 8.36 ± 2.91, 9.07 ± 2.91 and 9.76 ± 2.91 g% respectively.

The mean ± S.D. of erythrocyte sedimentation rate (ESR) recorded at 0 month, after 1 month and after 2 months in experimental control group were 12.83 ± 2.75, 13.02 ± 2.62 mm/Hr respectively and 13.24 ± 2.48 mm/Hr respectively and in experimental patient group were 13.77 ± 3.81, 12.72 ± 3.61, 11.92 ± 3.61 mm/Hr respectively.
Table 20 shows t values (p<0.05) of physiological parameters of females belonging to experimental control group and experimental patient group of osteoarthritis knee patients at different time intervals. The mean values of haemoglobin as recorded for experimental control group and experimental patient group of osteoarthritis knee patients when compared statistically after regular intervals were found significant after 1 month and after 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 2 months of EPG, after 1 month of ECG Vs 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.

The mean values of erythrocyte sedimentation rate when compared statistically between the groups showed significant results only after 1 month of ECG Vs 2 months of EPG.

**BIOCHEMICAL PARAMETERS**

Table 21 shows mean values of biochemical parameters of males belonging to experimental control group and experimental patient group of osteoarthritis knee patients at 0 month, after 1 month and after 2 months. The mean ± S.D. of fasting blood glucose recorded in experimental control group at 0 month, after 1 month and after 2 months were 118.27 ± 15.73, 113.70 ± 13.37 and 109.27 ± 15.07 mg% respectively and in experimental patient group were 114.50 ± 17.36, 105.78 ± 14.17 and 97.34 ± 12.12 mg% respectively.
The mean ± S.D. of serum cholesterol recorded at 0 month, after 1 month and after 2 months in experimental control group were 212.20 ± 18.74, 204.87 ± 14.79 and 206.80 ± 14.31 mg% respectively and in experimental patient group were 216.94 ± 17.64, 205.94 ± 16.39 and 191.94 ± 19.76 mg% respectively.

The mean ± S.D. of serum triglyceride at 0 month, after 1 month and after 2 months in experimental control group were 181.80 ± 36.28, 169.0 ± 36.32 and 162.70 ± 34.04 mg% respectively and in experimental patient group were 180.47 ± 39.55, 165.19 ± 40.70 and 136.91 ± 26.19 mg% respectively.

The mean ± S.D. of serum high density lipoprotein-cholesterol (HDL-c) at 0 month, after 1 month and after 2 months in experimental control group were 52.50 ± 6.44, 54.4 ± 5.46 and 52.7 ± 5.19 mg% respectively and in experimental patient group were 49.78 ± 6.58, 53.78 ± 5.79 and 59.31 ± 7.11 mg% respectively.

The mean ± S.D. of serum uric acid at 0 month, after 1 month and after 2 months in experimental control group were 5.29 ± 1.38, 5.10 ± 1.35 and 4.93 ± 1.31 mg% respectively and in experimental patient group were 5.29 ± 1.38, 5.10 ± 1.35 and 4.93 ± 1.31 mg% respectively.
Table 22 shows t values (p<0.05) of biochemical parameters of males belonging to experimental control group and experimental patient group of osteoarthritis knee patients at different time intervals. The mean values of fasting blood glucose as recorded for experimental control group and experimental patient group of osteoarthritis knee patients when compared statistically after regular intervals were found significant after 1 month and after 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 1 and 2 months of EPG, after 2 months of ECG Vs 2 months of EPG.

The mean values of serum cholesterol when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 2 months of EPG, after 1 month of ECG Vs 0 and 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.

The mean values of serum triglycerides when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 2 months of EPG, after 1 month of ECG Vs 0 and 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.

The mean values of serum high density lipoprotein-cholesterol when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation
programme i.e. at 0 month of ECG Vs 2 months of EPG, after 1 month of ECG Vs 0 and 2 months of EPG, after 2 months of ECG Vs 2 months of EPG.

The mean values of serum uric acid when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. after 1 month of ECG Vs 0 month of EPG and after 2 months of ECG Vs 0 and 1 month of EPG.

Table 23 shows mean values of biochemical parameters of females belonging to experimental control group and experimental patient group of osteoarthritis knee patients at 0 month, after 1 month and after 2 months. The mean ± S.D. of fasting blood glucose recorded in experimental control group at 0 month, after 1 month and after 2 months were 119.0 ± 15.46, 114.64 ± 13.90 and 110.83 ± 13.19 mg% respectively and in experimental patient group were 117.94 ± 15.23, 108.78 ± 12.01 and 98.54 ± 11.22 mg% respectively.

The mean ± S.D. of serum cholesterol recorded at 0 month, after 1 month and after 2 months in experimental control group were 258.81 ± 47.94, 255.23 ± 45.77 and 250.27 ± 45.78 mg% respectively and in experimental patient group were 246.42 ± 43.24, 209.06 ± 13.31 and 198.81 ± 13.24 mg% respectively.
The mean ± S.D. of serum triglyceride at 0 month, after 1 month and after 2 months in experimental control group were 192.21 ± 33.23, 185.01 ± 45.57 and 178.09 ± 38.01 mg% respectively and in experimental patient group were 188.54 ± 35.71, 173.56 ± 35.42 and 155.68 ± 29.18 mg% respectively.

The mean ± S.D. of serum high density lipoprotein-cholesterol (HDL-c) at 0 month, after 1 month and after 2 months in experimental control group were 44.19 ± 7.07, 46.14 ± 6.70 and 46.79 ± 6.61 mg% respectively and in experimental patient group were 43.90 ± 6.98, 47.59 ± 6.35 and 56.47 ± 7.21 mg% respectively.

The mean ± S.D. of serum uric acid at 0 month, after 1 month and after 2 months in experimental control group were 5.45 ± 1.16, 5.32 ± 1.23 and 5.13 ± 1.23 mg% respectively and in experimental patient group were 5.62 ± 1.29, 5.48 ± 1.41 and 5.24 ± 1.35 mg% respectively.

Table 24 shows t values (p<0.05) of biochemical parameters of females belonging to experimental control group and experimental patient group of osteoarthritis knee patients at different time intervals. The mean values of fasting blood glucose as recorded for experimental control group and experimental patient group of osteoarthritis knee patients when compared statistically after regular intervals were found significant after 1 month and
after 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 1 and 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.

The mean values of serum cholesterol when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 2 months of EPG, after 2 months of ECG Vs 1 and 2 months of EPG.

The mean values of serum triglycerides when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 2 months of EPG, after 2 months of ECG Vs 2 months of EPG.

The mean values of serum high density lipoprotein-cholesterol when compared statistically between the groups showed significant results after 1 month and 2 months of exercise rehabilitation programme i.e. at 0 month of ECG Vs 1 and 2 months of EPG, after 1 month of ECG Vs 2 months of EPG, after 2 months of ECG Vs 0 and 2 months of EPG.

The mean values of serum uric acid when compared statistically between the groups showed significant results only after 2 months of ECG Vs 0 month of EPG.