RESULTS

The results of this study are represented in Tables (1-30) and Figs. (3-31), for all the studied parameters.

(I) Age (Years)

The results of age in the studied groups are represented in Table (1) and Fig. (3).

Table (1) shows the analysis of variance (ANOVA) of age in the studied groups, the results were highly significant ($P < 0.01$).

It can be seen that the age in Volleyball players ranged between (17-24) with a mean value (20.5 ± 2.714). Range of age in the Football team was between (19-33) with the mean value of (25 ± 3.559), and they were the oldest players. The age in Handball players ranged between (20-28) with a mean value of (23.429 ± 2.58). The age of rowing team ranged between (18-28) with a mean value of (21.875 ± 3.810). The youngest players were those of the Taikondo team, with a range between (16-30) and a mean value (19.812 ± 1.905).

Table (1-) shows the least significant difference test (LSD), and there was significant variation between Volleyball team vis Football team and Handball teams. Also, significant differences were between Football team vis Rowing and Taikondo teams, and between Handball team vis Taikondo team ($P < 0.05$).

(II) Height (cm)

The results of height in the studied groups are presented in Table (2) and Fig. (4)

Table (2), show the ANOVA of height in the studied groups, the results were highly significant ($P < 0.01$).

It can be seen that the height in Volleyball players ranged between (174-190) with a mean value (183.667 ± 4.519). The Football players were the shortest and their height ranged between (164-187) with the mean value of (176.158 ± 5.919). The height of Handball players ranged between (172-202) with a mean value of (182.143 ± 7.438). The height in the Rowing team ranged between (176-193) with the highest mean value of (184.188 ± 4.833). The Taikondo players showed the range between (174-189) with a mean value of (180.062 ± 5.144).

Table (2-) shows the results of LSD test between the different teams. The differences were significant between Football team vis Volleyball, Handball and Rowing teams and Taikondo team vis Rowing team ($P < 0.05$).

(III) Weight (kg)

Table (3) and Fig. (5), represent the values of weight in all the studied groups.

Table (3) shows the ANOVA of weight in the studied groups, the results were highly significant ($P < 0.01$).

It can be seen that the weight of Volleyball players was between (65-92) with a mean value (81 ± 6.915). The weight of Football players ranged between (61-85) with the mean value of (74.684 ± 6.929). The Handball players were the heaviest and their weight ranged between (71-115) with a mean value of (86.048 ± 10.524). The weight of Rowing players ranged between (71-100) and the mean value was (84.562 ± 9.388). The lightest players were those of Taikondo team with a range between (54-89) with a mean value of (72.5 ± 9.026).

Table (3-), for the LSD test, shows that the differences were significant ($P < 0.05$) between Volleyball players vis Taikondo team, and Football team vis Handball and Rowing teams, also between Rowing team vis the team of Taikondo.

(IV) Heart Rate during Exercise Time (Beats/minute)

(1) Resting pulse

Table (4), shows the ANOVA of height in the studied groups, the results were highly significant ($P < 0.01$).

It can be seen that the resting pulse rate of the Volleyball players ranged between (60-110) with the mean value of (82.5 ± 14.927). The Football team players had the lowest value of resting pulse rate which ranged between (43-79) with the mean value of (63.526 ± 8.89). The range of resting pulse of the Handball team was between (56-113) and the mean value was (83.095 ± 14.082). The Rowing team players has the highest value of resting pulse rate which ranged between (66-107) with the mean value of (88.125 ± 9.972). The range for Taikondo team was between (58-100) with the mean value of (83.375 ± 11.183).

Table (4-), for the LSD test, indicates statistically significant differences ($P < 0.05$) between Football team vis other teams.

(2) Heart rate at load (1)

Table (5), shows the ANOVA of pulse rate at load (1), i.e. in the first 3 minutes at a load of 30 watt, in the studied groups, the results were highly significant ($P < 0.01$).

mean value of (121.048 ± 11.430). The players of Rowing team had a range of pulse rate between (118-149) with a mean value of (133.438 ± 8.914). The range of pulse rate of Taikondo team was between (109-148) and the mean value was (130.688 ± 13.460).

Table (6-), for the LSD test, shows that the comparison between the studied groups were significant ($P < 0.05$), except that between Volleyball team vis Handball team and between Rowing players vis Taikondo team.

(4) Heart rate at load (5)

Table (7), shows the ANOVA of pulse rate at load (1), i.e. at a load of 150 watt after 12 minutes exercise time, in the studied groups, the results were highly significant ($P < 0.01$).

It can be seen that the Volleyball players had the least pulse rate which ranged between (113-176) with a mean value of (129.25 ± 21.846). On the other hand, the Football team had the maximum pulse rate which was 168 for only one player who could continue the test to that load. The handball players pulse rate ranged between (112-159) with a mean value of (134.762 ± 14.56). The number of players of Rowing team was reduced from 16 to 15 players with pulse rate ranged between (128-167)

and the mean value was (147.467 ± 11.795). The Taikondo team had a range between (130-174) with a mean value of (150.875 ± 13.205).

Table (7^{-}), for LSD test, shows that the comparison between the studied groups indicates statistically significant differences ($P < 0.05$) between Volleyball team vis Football, Rowing and Taikondo teams, also between Handball team vis Football, Rowing and Taikondo teams.

* The changes of heart rate during the time of exercise of the studied groups are represented in Figs. (9-14). The number of players and the reduction of it with time of exercise is represented in Fig. (15).

(V) Maximum Pulse Rate (Beats/min)

The resutls are presented in Table (8) and Fig. (7).

Table (8) shows the ANOVA of maximum pulse rate, in the studied groups, the results were highly significant ($P < 0.01$).

It can be seen that the maximum pulse rate of Volleyball players ranged between between (133-209) with a mean value

of (174 ± 19.628). The Football team had the lowest record that ranged between (130-190) with a mean value of (168.895 ± 13.345). The range of Handball players was between (163-195) and the mean value was (180.429 ± 10.51). The Rowing team had the maximum record which ranged between (176-202) with a mean value of (190.438 ± 6.398). The range of the Taikondo players was between (170-197) with a mean value of (183.75 ± 8.583).

Table (8), for LSD test, shows that there were significant differences ($P < 0.05$) between Volleyball team vis Rowing and Taikondo teams, also Football team vis Rowing and Taikondo teams, and also between Handball team vis Rowing team.

(VI) Examination Time (min)

The results of examination time are represented in Table (9) and Fig. (8).

Table (9), shows the ANOVA of the examination time, in the studied groups, the results were highly significant ($P < 0.01$).

It can be seen that the examination time of Volleyball players ranged between (12-23) with a mean value of (7.708 ± 3.532) which was the highest value among the studied groups. The examination time of the Football players ranged between (3.5-12) with a mean value of (5.579 ± 1.669), which was the lowest value among the all studied teams. The range of examination time of Handball team was between (11-18) and the mean value was (14.738 ± 2.131). The Rowing team players had a range between (13-20) with a mean value (16.688 ± 2.097). The range for Taikondo players was between (10-21) with a mean value of (16.344 ± 2.694).

Table (9-), for the LSD test, shows by interteam comparison that there were significant differences ($P < 0.05$) between all teams except on comparing Volleyball team vis. Rowing and Taikondo teams and also between Rowing team vis. Taikondo team.

{VII} $Vo_{2\,max}$ (Liters/min.)

The results of $Vo_{2\,max}$ for all groups are represented in table (10) and Fig. (16).

Table (10), shows the ANOVA of $Vo_{2\,max}$ in the studied groups, the results were highly significant ($P < 0.01$).

The Volleyball team had a range between (2.24-4.12) with a mean value (3.251 ± 0.554). The Football team has a high value of $Vo_{2\,max}$ ranged between (2.33-4.99) with a mean value of (3.456 ± 0.575). The handball team range of $Vo_{2\,max}$ was between (1.17 - 3.88) with a mean value (2.632 ± 0.76). The Rowing team has the highest value which ranged between (2.02 - 4.85) with a mean value of (3.631 ± 0.708). The Taikondo team had a range between (1.8 - 3.95) with a mean value of (2.929 ± 0.87).

It is important to notice that, although the Football team had a high $Vo_{2\,max}$, it had the lowest value of both examination time and maximum pulse rate as shown before in Tables (8 and 9).

Table (10^{-}), for LSD test, shows that there were significant differences ($P < 0.05$) between Volleyball vis. Handball and Taikondo teams and Rowing teams vis. Handball and Taikondo teams.

(VIII) Vo_2 at watt 30 (Liter/min)

These results of Vo_2 at watt 30 are represented in Table (11) and Fig. (17). The high results represent a rapid capability for utilizing oxygen.

Table (11), shows the ANOVA of Vo_2 at watt 30, in the studied groups, the results were highly significant ($P < 0.01$).

It can be seen that the value of Vo_2 at watt 30 for Volleyball team ranged between (0.05 - 1.07) with a mean value of (0.517 ± 0.356). The Football players had a range between (0.02 - 0.85) with a mean value of (0.278 ± 0.273). The range for Handball team was between (0.01 - 0.78) and the mean value was (0.206 ± 0.184). The results of the Rowing team ranged between (0.03 - 0.83) whilst the mean value was (0.275 ± 0.216). The greatest value was that of the Taikondo team with a range between (0.25 - 1.17) and the mean value was (0.649 ± 278).

In table (11-), for LSD test, the interteam comparison shows significant variation ($P < 0.05$) that were found between Volleyball team vis. Football, Handball and Rowing teams, and between Taikondo team vis. Football, Handball and Rowing Teams.

(IX) Recovery pulse rate (Beats/min)

Figures 18-22 represent the changes in the recovery pulse rate from the end of exercise till the fifth minute of recovery time for each team. Figure 23 represents a comparison for these changes in all studied groups.

(1) Recovery pulse rate after 1 minute

Table (12), shows the ANOVA of recovery pulse after 1 minute in the studied groups, the results were highly significant ($P < 0.01$).

It can be seen that this pulse rate of the Volleyball players ranged from (78 - 167) with a mean value of (128.583 ± 27.923). The lowest value was that of Football players with a range between (85 - 150) and a mean value of (125.947 ± 14.246). The result of Handball players ranged between (108-168) with a mean value (139.048 ± 14.347). The highest value was that of Rowing team and ranged between (130 - 173) with a mean value of (147.483 ± 12.956). The range for Taikondo team was between (126 - 160) and the mean value was (144.2 ± 11.453).

Table (12), for LSD tet, shows significant differences ($P < 0.05$) that were recorded between Volleyball team vis. Rowing and Taikondo teams, between Football team vis. Handball and Taikondo teams.

(2) Recovery pulse after 3 minutes

Table (13), shows the ANOVA of the recovery pulse rate after 3 minutes in the studied groups, the results were highly significant ($P < 0.01$).

It is shown that the pulse rate of the Volleyball players ranged between (69 - 128) with a mean value (107.333 ± 19.388). The least value belonged to Football team with a range between (51 - 118) and a mean value of (96.158 ± 16.668). The results of Handball players ranged between (88 - 129) with a mean value of (111.048 ± 10.595). The Rowing team had a range between (112 - 148) with a mean value of (116.25 ± 27.622). The highest value was that of Taikondo team and ranged between (97 - 145) with a mean value of (117.2 ± 17.354).

Table (13-), for LSD test, shows significant differences ($P < 0.05$) between Football team vis. Handball, Rowing and Taikondo teams.

(3) Recovery pulse rate after 5 minutes

Table (14), shows the ANOVA of the recovery pulse rate after 5 minutes in the studied groups, the results were highly significant ($P < 0.01$).

It is shown that the Volleyball players had a range between (65 - 123) with a mean value (101.333 ± 18.431). The Football team had the lowest pulse rate after 5 minutes recovery which ranged between (49 -109) with a mean value of (90.579 ± 15.507). That recovery pulse rate of Handball team ranged between ((85-125) and with a mean value (130.571 ± 11.868). The Rowing team had the highest value with a range between (105 - 134) and a mean value of (115.5 ± 7.849). The range for the Taikondo team was between (86 - 139) and the mean value was (109.6 ± 13.715).

Table (14), for LSD test, shows significant differences ($P < 0.05$) that were found between all groups except Volleyball team vis. Handball team and Taikondo team vis. Handball and Rowing teams.

(X) Pulmonary Functions

(1) Vital capacity (Liters)

The results of all studied groups are represented in Table (15) and Fig. (24). The highest value was that of Volleyball team while the lowest value was that of Football team.

Table (15), shows the ANOVA of the vital capacity in the studied groups, the results were significant ($P < 0.05$).

It can be seen that the vital capacity of Volleyball players ranged between (5 - 6.81) with a mean value (5.814 ± 0.571). The Football players had their range between (3.13 - 6.24) with a mean value of (4.956 ± 0.738). The range for Handball team was between (4.38 - 6.38) with a mean value of (5.5 ± 0.609). The Rowing team range of vital capacity was between (4.24 - 6.25) and the mean value was (5.461 ± 0.557). The Taikondo team has the range of vital capacity between (3.75 - 8.3) with a mean value of (5.36 ± 1.185).

Table (15), for LSD test, shows the significant differences ($P < 0.05$) only between Football vis. Volleyball and Handball teams.

(2) Forced expiratory volume one (FEV_1) (Liters)

The results of all studied groups are represented in Table (16) and Fig. (25). The highest value was that of the Handball team and the lowest value was that of the Football team.

Table (16), shows the ANOVA of FEV_1 in the studied groups, the results were statistically insignificant ($P > 0.05$).

3. Forced vital capacity (FVC) (Liters)

The results of all studied groups are represented in table (17) and Fig. (26). The Volleyball team had the highest value, while the lowest one was that of Football team.

Table (17), shows the ANOVA of FVC in the studied groups, the results were highly significant ($P < 0.01$).

It can be seen that the FVC if Volleyball team ranged between (4.41 - 7.06) with a mean value of (5.714 ± 0.571). The Football team had a range between (3.46 - 6.72) with a mean value of (5.015 ± 0.738). The range of Handball team was between (4.42 - 6.45) and the mean value was (5.639 ± 0.609). The Rowing team had the range of FVC between (4.55 - 6.25) with a mean value of (5.456 ± 0.557). The FVC of Taikondo team ranged between (3.89 - 8.21) with a mean value (5.201 ± 1.185).

Table (17-), for LSD test, shows significant differences ($P < 0.05$) only between Football team vis. Volleyball and Handball teams.

(4) FEV_1/FVC %

The results of all studied groups are represented in Table (18) and Fig. (27). The highest value was that of Football team, while the lowest value was that of Volleyball team.

Table (18), shows the ANOVA of $FEV_1/FVC\%$ in the studied groups, the results were highly significant ($P < 0.01$).

It can be seen that $FEV_1/FVC\%$ in the Volleyball players ranged between (53-88) with a mean value of (75.771 ± 10.844). The range of Football team was between (71-93) with a mean value of (85.75 ± 8.128). The Handball team had a range between (71-93) with a mean value of (84.029 ± 5.644). The result of this parameter of Rowing team ranged between (78-92) with a mean value of (83.894 ± 4.279). The range of Taikondo team was between (71-95) with a mean value of (84.973 ± 7.104).

Table (18), for LSD test, shows significant variations ($P < 0.05$) between Volleyball teams and other teams.

(5) Peak expiratory flow (PEF) (Liters/sec.)

The result of all studied groups are represented in Table (19) and Fig. (28). The highest value belonged to the Handball team, while the lowest value was that of the Volleyball team.

Table (19), shows the ANOVA of PEF in the studied groups, the results were statistically significant ($P < 0.05$).

It can be seen that the range of PEF in the Volleyball team was between (226 - 609) with mean value of (469.25 ± 160.921). The range of Football players was between (328 - 733) with a mean value of (549.158 ± 105.739). The Handball team had a range between (440 - 766) with a mean value of (590 ± 99.752). The Rowing team results ranged between (429 - 710) with a mean value of (572.188 ± 80.506). The Taikondo team had a range between (372 - 921) with a mean value of (527.125 ± 159.426).

Table (19-), for LSD test, shows that the interteam comparisons showed significant differences ($P < 0.05$) only between Volleyball team vis. Handball and Rowing teams.

(6) Forced mid-expiratory flow (FMEF) (Liters/sec)

The results of all studied groups are represented in Table (20) and Fig. (29). The highest value belonged to the Handball team while the Volleyball team had the lowest value.

Table (20), shows the ANOVA of FMEF in the studied groups, the results were statistically insignificant ($P > 0.05$).

(7) Forced mid-expiratory flow time (FMET) (sec)

The results of all studied groups are represented in Table (21) and Fig. (30). The highest FMET was that of the Volleyball team, while the Football team had the lowest value.

Table (21), shows the ANOVA of FMET in the studied groups, the results were statistically significant ($P < 0.05$).

It can be seen that the FMET of Volleyball players ranged between (0.51 - 1.12) with a mean value of (0.751 ± 0.214). The range of the Football team was between (0.34 - 0.96) a mean value of (0.562 ± 0.147). The Handball team had a range between (0.38 - 1.02) with a mean value of (0.591 ± 0.16). The Rowing team FMET ranged between (0.42 - 0.73) with a mean value of (0.588 ± 0.093). The range of Taikondo team was between (0.37 - 1.08) and the mean value was (0.581 ± 0.183).

Table (21-), for LSD test, shows significant variations ($P < 0.05$) between Volleyball team and other teams.

(8) Maximum ventilatory volume (MVV index) (Liters/min)

The results of all studied groups are represented in Table (22) and Fig. (31). The highest value was that of Handball team, while the Football team had the lowest value.

Table (22), shows the ANOVA of MVV in the studied groups, the results were statistically insignificant ($P > 0.05$).

(XI) Correlation Study of $Vo_{2\,max}$

The correlations were done between $Vo_{2\,max}$ with weight, resting pulse, maximum pulse, recovery pulse at 1, 3, and 5 minutes (Rec. 1, Rec. 3, and Rec. 5), examination time and MVVindex. The results were tabulated in Tables (23-28).

1. Table (23), shows these correlations for all the 84 players. There was no significant correlation.

2. Table (24), shows these correlations for the Volleyball team. The correlations were significant with Rec1, Rec3, and Rec5 ($P < 0.05$).

3. Table (25), shows these correlations for the Football team. There was no significant correlation.

4. Table (26), shows these correlations for Handball team. There was a high significant correlation ($P < 0.01$) with examination time.

5. Table (27), shows these correlations for the Rowing team. There were significant correlations ($P < 0.05$) with resting pulse and Rec3 and a high significant correlation ($P < 0.01$) with examination time.

6. Table (28), shows these correlations for the Taikondo team. There was a high significant correlation ($P < 0.01$) with examination time.

{XII} Stepwise regression analysis for $Vo_2 max$ of the studied players

Table (29) shows that by stepwise regression analysis, for $Vo_2 max$ of the studied groups, the values that were found to enter the equation were resting pulse, Rec1, Rec3, and examination time, and this is in order of their importance. On the other hand, the variables which were not in the equation, i.e. they do not influence $Vo_2 max$ in the studied groups were age, weight, height, Rec5, V.C., FVC, FEV, FMEF, PEF, MVVind, FMET, FEV1/FEVC% and the maximum pulse rate.

(XIII) Multiple regression analysis for $Vo_{2\,max}$ of the studied groups

Table (30) shows the values to be used in the prediction equation for $Vo_{2\,max}$ of these groups.

The prediction equation was :

$$Vo_{2\,max} = 2.44 + [-0.016 \times \text{Resting pulse}] + [0.017 \times \text{Rec1}] + [-0.006 \times \text{Rec3}] + [0.026 \times \text{Exam time}].$$

Table 1 : Analysis of Variance (ANOVA) of age (in years) in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	17 - 24	20.500	2.714
Football	19	19 - 33	25.000	3.559
Handball	21	20 - 28	23.429	2.580
Rowing	16	18 - 28	21.875	3.810
Taikondo	16	16 - 30	19.812	1.905
F	8.446			
P	< 0.01			

(1˜) LSD (least significant difference test) for age.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	2.207	< 0.05
Volleyball Vs. Handball	2.166	< 0.05
Volleyball Vs. Rowing	2.286	> 0.05
Volleyball Vs. Taikondo	2.286	> 0.05
Football Vs. Handball	1.895	> 0.05
Football Vs. Rowing	2.031	< 0.05
Football Vs. Taikondo	2.031	< 0.05
Handball Vs. Rowing	1.986	> 0.05
Handball Vs. Taikondo	1.986	< 0.05
Rowing Vs. Taikondo	2.116	> 0.05

Table (1) shows that the ANOVA of age between the studied groups was highly signifcant (P<0.01).
The football team had the relative older players (mean 25 ± 3.559) while those of taikondo team were the youngest (mean 19.812 ± 1.905) and then the volleyball team (mean 20.5 ± 2.714) were the youngest.

Table (1˜) shows that the differences were significant (P<0.05) between volleyball team vis football and handball teams. Also, significant differences were between football team vis rowing and taikondo teams and between handball team vis taikondo team.

Table 2 : Analysis of Variance (ANOVA) of height (in cm) in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	174 - 190	183.667	4.519
Football	19	164 - 187	176.158	5.919
Handball	21	172 - 202	182.143	7.438
Rowing	16	176 - 193	184.188	4.833
Taikondo	16	174 - 189	180.062	5.144
F	5.357			
P	< 0.01			

(2˜) LSD (least significant difference test) for height.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	4.298	< 0.05
Volleyball Vs. Handball	4.218	> 0.05
Volleyball Vs. Rowing	4.452	> 0.05
Volleyball Vs. Taikondo	4.452	> 0.05
Football Vs. Handball	3.691	< 0.05
Football Vs. Rowing	3.955	< 0.05
Football Vs. Taikondo	3.955	> 0.05
Handball Vs. Rowing	3.868	> 0.05
Handball Vs. Taikondo	3.868	> 0.05
Rowing Vs. Taikondo	4.121	< 0.05

Table (2) shows that the ANOVA of height between the studied groups was highly signifcant (P<0.01).
The height was found to be greater in rowing team (184.188 ± 4.833), then in teams of volleyball (183.667 ± 4.519) and handball (182.143 ± 7.438). The least height belonged to football team (176.158 ±5.919).

Table (2˜) shows that the differences were significant (P<0.05) between volleyball team vis football team, handball team vis football team, rowing team vis football team and lastly rowing team vis taikondo team.

Table 3 : Analysis of Variance (ANOVA) of weight (in kg) in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	65 - 92	81.000	6.915
Football	19	61 - 85	74.684	6.929
Handball	21	71 - 115	86.048	10.524
Rowing	16	71 100	84.562	9.388
Taikondo	16	54 - 89	72.500	9.026
F	8.187			
P	< 0.01			

(3¯) LSD (least significant difference test) for weight.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	6.476	> 0.05
Volleyball Vs. Handball	6.355	> 0.05
Volleyball Vs. Rowing	6.707	> 0.05
Volleyball Vs. Taikondo	6.707	< 0.05
Football Vs. Handball	5.561	< 0.05
Football Vs. Rowing	5.959	< 0.05
Football Vs. Taikondo	5.959	> 0.05
Handball Vs. Rowing	5.828	> 0.05
Handball Vs. Taikondo	5.828	< 0.05
Rowing Vs. Taikondo	6.209	< 0.05

Table (3) shows that the ANOVA of weight between the studied groups was highly signifcant (P<0.01).
It is evident statistically the the handball team had the heaviest weight (86.048 ± 10.524) and then the rowing team (84.562 ± 9.388). The least weight belonged to the team of taikondo (72.5 ± 9.026) and next to it was the football team (74.684 ± 6.929).

Table (3¯) shows that the differences were significant (P<0.05) between volleyball team vis taikondo team, football team vis handball and rowing teams and between rowing team vis the team of taikondo.

Table 4 : Analysis of Variance (ANOVA) of pulse (beats/min) at rest in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	60 - 110	82.500	14.927
Football	19	43 - 79	63.526	8.890
Handball	21	56 - 113	83.095	14.082
Rowing	16	66 - 107	88.125	9.972
Taikondo	16	58 - 100	83.375	11.183
F	11.732			
P	< 0.01			

(4˜) LSD (least significant difference test) for pulse at rest.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	8.743	< 0.05
Volleyball Vs. Handball	8.580	> 0.05
Volleyball Vs. Rowing	9.054	> 0.05
Volleyball Vs. Taikondo	9.054	> 0.05
Football Vs. Handball	7.507	< 0.05
Football Vs. Rowing	8.045	< 0.05
Football Vs. Taikondo	8.045	< 0.05
Handball Vs. Rowing	7.868	> 0.05
Handball Vs. Taikondo	7.868	> 0.05
Rowing Vs. Taikondo	8.383	> 0.05

Table (4) shows that the ANOVA of pulse rate at rest between the studied groups was highly signifcant ($P<0.01$).
Maximum resting pulse rate belonged to rowing team (88.125 ± 9.972), while the football team showed the least resting pulse rate (63.526 ± 8.89).

Table (4˜) shows that the statistically significant differences ($P<0.05$) were between volleyball team vis football team and between football team vis the teams of handball, rowing and taikondo.

Table 5 : Analysis of Variance (ANOVA) of pulse (beats/min) in load 1 in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	70 - 137	97.000	19.442
Football	19	56 - 134	107.158	26.334
Handball	21	73 - 124	96.476	12.898
Rowing	16	92 - 118	103.062	8.614
Taikondo	16	93 - 130	107.436	13.150
F	1.609			
P	< 0.01			

(5¯) LSD (least significant difference test) for pulse at load 1.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	12.707	> 0.05
Volleyball Vs. Handball	12.470	> 0.05
Volleyball Vs. Rowing	13.160	> 0.05
Volleyball Vs. Taikondo	13.160	> 0.05
Football Vs. Handball	10.911	> 0.05
Football Vs. Rowing	11.693	> 0.05
Football Vs. Taikondo	11.693	> 0.05
Handball Vs. Rowing	11.435	> 0.05
Handball Vs. Taikondo	11.435	> 0.05
Rowing Vs. Taikondo	12.184	> 0.05

Table (5) shows that the ANOVA of pulse rate at load 1, i.e. in the first 3 minutes at load of 30 watt, between the studied groups was highly signifcant (P<0.01), showing that the highest pulse rate belonged to the team of taikondo (107.436 ± 13.15) and then to football team (107.158 ± 26.334). The lowest pulse rate was for the teams of handball (96.476 ± 12.899) and volleyball (97 ± 19.442).

Table (5¯) indicates statistically insignificant results (P>0.05) by comparing the different groups.

Table 6 : Analysis of Variance (ANOVA) of pulse (beats/min) at load 3 in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	75 - 165	111.667	25.411
Football	12	110 - 186	172.000	8.842
Handball	21	99 - 138	121.048	11.430
Rowing	16	118 - 149	133.438	8.914
Taikondo	16	109 - 148	130.688	13.460
F	33.229			
P	< 0.01			

(6⁻) LSD (least significant difference test) for pulse at load 3.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	11.544	< 0.05
Volleyball Vs. Handball	10.233	> 0.05
Volleyball Vs. Rowing	10.799	< 0.05
Volleyball Vs. Taikondo	10.799	< 0.05
Football Vs. Handball	10.233	< 0.05
Football Vs. Rowing	10.799	< 0.05
Football Vs. Taikondo	10.799	< 0.05
Handball Vs. Rowing	9.384	< 0.05
Handball Vs. Taikondo	9.384	< 0.05
Rowing Vs. Taikondo	9.998	> 0.05

Table (6) shows that the ANOVA of pulse rate at load 3, i.e. watt 110 after 9 minutes, between the studied groups was highly signifcant ($P<0.01$), showing that the football team had the maximum pulse rate (172 ± 8.842), but not all the team members completed the effort till that load. The least pulse belonged to volleyball team (111.667 ± 25.411) which indicates ability to do such effort with less cardiac effort.

Table (6⁻) shows that the comparison between the stuided groups was significant ($P<0.05$) except that between volleyball team vis handball team and rowing team vis taikondo team.

Table 7 : Analysis of Variance (ANOVA) of pulse (beats/min) at load 5 in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	113 - 176	129.250	21.486
Football	1	168	168.000	
Handball	21	112 - 159	134.762	14.560
Rowing	15	128 - 167	147.467	11.795
Taikondo	16	130 - 174	150.875	13.205
F	5.823			
P	< 0.01			

(7˜) LSD (least significant difference test) for pulse at load 5.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	31.671	< 0.05
Volleyball Vs. Handball	11.011	> 0.05
Volleyball Vs. Rowing	11.785	< 0.05
Volleyball Vs. Taikondo	11.620	< 0.05
Football Vs. Handball	31.145	< 0.05
Football Vs. Rowing	31.426	> 0.05
Football Vs. Taikondo	31.365	> 0.05
Handball Vs. Rowing	10.287	< 0.05
Handball Vs. Taikondo	10.097	< 0.05
Rowing Vs. Taikondo	10.936	> 0.05

Table (7) shows that the ANOVA of pulse rate at load 5 (150 watt after 12 minutes).
The results were statistically highly significant ($P<0.01$) showing that the least pulse rate belonged to volleyball team (129.25 ± 21.486). On the other hand, the football team had the maximum pulse rate (168) and only one player could continue to that load till this time.

In table (7˜) the comparison between the groups indicates statistically significant ($P<0.05$) variations between volleyball team vis football, rowing and taikondo teams. Also between handball team vis football, rowing and taikondo teams.

Table 8 : Analysis of Variance (ANOVA) of maximum pulse rate (beats/min) in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	133 - 209	174.000	19.628
Football	19	130 - 190	168.895	13.345
Handball	21	163 - 195	180.429	10.510
Rowing	16	176 - 202	190.438	6.398
Taikondo	16	170 - 197	183.750	8.583
F	8.199			
P	< 0.01			

(8˜) LSD (least significant difference test) for maximum pulse rate.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	8.807	> 0.05
Volleyball Vs. Handball	8.643	> 0.05
Volleyball Vs. Rowing	9.121	< 0.05
Volleyball Vs. Taikondo	9.121	< 0.05
Football Vs. Handball	7.562	< 0.05
Football Vs. Rowing	8.104	< 0.05
Football Vs. Taikondo	8.104	< 0.05
Handball Vs. Rowing	7.926	< 0.05
Handball Vs. Taikondo	7.926	> 0.05
Rowing Vs. Taikondo	8.444	> 0.05

Table (8) shows that the ANOVA of the maximum pulse rate in the studied groups was highly signifcant ($P<0.01$).
The rowing team had the maximum pulse rate (190.438 ± 6.398) while the football team had the lowest record (168.895 ± 13.345).

In table (8˜) the LSD test shows significant difference results ($P<0.05$) between volleyball team vis rowing and taikondo teams, football team vis rowing and taikondo teams, and lastly between handball team vis rowing team.

Table 9 : Analysis of Variance (ANOVA) of examination time (in minutes) in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	12 - 23	17.708	3.532
Football	19	3.5 - 12	5.579	1.669
Handball	21	11 - 18	14.738	2.131
Rowing	16	13 - 20	16.688	2.097
Taikondo	16	10 - 21	16.344	2.694
F	75.115			
P	< 0.01			

(9˜) LSD (least significant difference test) for examination time.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	1.758	< 0.05
Volleyball Vs. Handball	1.725	< 0.05
Volleyball Vs. Rowing	1.820	> 0.05
Volleyball Vs. Taikondo	1.820	> 0.05
Football Vs. Handball	1.509	< 0.05
Football Vs. Rowing	1.617	< 0.05
Football Vs. Taikondo	1.617	< 0.05
Handball Vs. Rowing	1.582	< 0.05
Handball Vs. Taikondo	1.582	< 0.05
Rowing Vs. Taikondo	1.685	> 0.05

Table (9) shows that the ANOVA of exam time between the studied groups was highly signifcant (P<0.01).
It is clear that the football team could not perform more than (5.579 ± 1.669) minutes exercise time in average, while volleyball team was the most efficient team and could perform significant exercise time of (17.708 ± 3.532) minutes.
By comparing the exercise time performed of the diferent teams table (9˜) shows that there was significant difference in interteam comparison (P<0.05) except between volleyball team vis rowing and taikondo teams, and also between rowing team vis taikonodo team.

Table 10 : Analysis of Variance (ANOVA) of Vo_2 max in (liters/min) in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	2.24 - 4.12	3.251	0.554
Football	19	2.33 - 4.99	3.456	0.575
Handball	21	1.17 - 3. 88	2.632	0.760
Rowing	16	2.02 - 4.85	3.631	0.708
Taikondo	16	1.80 - 3.95	2.929	0.870
F	5.966			
P	< 0.01			

(10*) LSD (least significant difference test) for Vo_2 max.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	0.521	> 0.05
Volleyball Vs. Handball	0.511	< 0.05
Volleyball Vs. Rowing	0.539	> 0.05
Volleyball Vs. Taikondo	0.539	> 0.05
Football Vs. Handball	0.447	< 0.05
Football Vs. Rowing	0.479	> 0.05
Football Vs. Taikondo	0.479	< 0.05
Handball Vs. Rowing	0.469	< 0.05
Handball Vs. Taikondo	0.469	> 0.05
Rowing Vs. Taikondo	0.499	< 0.05

Table (10) shows that the ANOVA of Vo_2 max between the studied groups was highly signifcant (P<0.01).
The rowing team had the highest value (3.631 ± 0.708) followed by the football team (3.456 ± 0.575) and then the volleyball team (3.251 ± 0.554).
It is important to notice that, although, the football team had a high Vo_2 max, yet it had the lowest value of both examination time and maximum pulse rate as shown in table 8 and 9.

Table (10*) shows significant difference (P<0.05) between volleyball team vis handball team, football team vis handball and taikondo teams, and rowing team vis handball and taikondo teams.

Table 11 : Analysis of Variance (ANOVA) of Vo_2 (in liters/min) at watt 30 in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	0.05 - 1.07	0.517	0.356
Football	19	0.02 - 0.85	0.278	0.273
Handball	21	0.01 - 0.78	0.206	0.184
Rowing	16	0.03 - 0.83	0.275	0.216
Taikondo	16	0.25 - 1.17	0.649	0.278
F	8.909			
P	< 0.01			

(11˜) LSD (least significant difference test) for Vo_2 atwatt 30.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	0.189	< 0.05
Volleyball Vs. Handball	0.186	< 0.05
Volleyball Vs. Rowing	0.196	< 0.05
Volleyball Vs. Taikondo	0.196	> 0.05
Football Vs. Handball	0.163	> 0.05
Football Vs. Rowing	0.174	> 0.05
Football Vs. Taikondo	0.174	< 0.05
Handball Vs. Rowing	0.170	> 0.05
Handball Vs. Taikondo	0.170	< 0.05
Rowing Vs. Taikondo	0.182	< 0.05

Table (11) shows that the ANOVA in Vo_2 at watt 30 (3 minutes exercise) between the studied groups was highly signifcant ($P<0.01$).
The taikondo team had the greatest value (0.649 ± 0.278) and directly next to it was the volleyball team (0.517 ± 0.356).
This represents the rapid capability for utilizing oxygen.

In table (11˜) the interteam comparison shows significant ($P<0.05$) variations between volleyball team vis football, handball and rowing teams. Also, between taikondo team vis football, handball and rowing teams.

Table 12 : Analysis of Variance (ANOVA) of recovery pulse rate (in beats/min) after 1 minute in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	78 - 167	128.583	27.923
Football	19	85 - 150	125.947	14.246
Handball	21	108 - 168	139.048	14.347
Rowing	16	130 - 173	147.438	12.956
Taikondo	15	126 - 160	144.200	11.453
F	5.444			
P	< 0.01			

(12^{-}) LSD (least significant difference test) for the recovery pulse rate after 1 minute.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	11.960	< 0.05
Volleyball Vs. Handball	11.738	< 0.05
Volleyball Vs. Rowing	12.387	> 0.05
Volleyball Vs. Taikondo	12.563	> 0.05
Football Vs. Handball	10.270	> 0.05
Football Vs. Rowing	11.006	> 0.05
Football Vs. Taikondo	11.203	> 0.05
Handball Vs. Rowing	10.764	< 0.05
Handball Vs. Taikondo	10.965	< 0.05
Rowing Vs. Taikondo	11.658	< 0.05

Table (12) shows that the ANOVA in recorded pulse rate during recovery after 1 minute between the studied groups was highly signifcant ($P<0.01$).
The hightest value belonged to the rowing team (147.438 ± 12.956) while the lowest value was for the football team (125.947 ± 14.246) and next to it was the volleyball team (128.583 ± 27.923).

Table (12^{-}) shows significant difference ($P<0.05$) between volleyball team vis rowing and taikondo teams, and between football team vis handball and taikondo teams as well.

Table 13 : Analysis of Variance (ANOVA) of recovery pulse rate (in beats/min) after 3 minutes in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	69 - 128	107.333	19.388
Football	19	51 - 118	96.158	16.668
Handball	21	88 - 129	111.048	10.595
Rowing	16	112 - 148	116.250	27.622
Taikondo	15	97 - 145	117.200	17.354
F	3.678			
P	< 0.01			

(13˜) LSD (least significant difference test) for the recovery pulse rate after 3 minutes.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	13.670	> 0.05
Volleyball Vs. Handball	13.415	> 0.05
Volleyball Vs. Rowing	14.157	> 0.05
Volleyball Vs. Taikondo	14.358	> 0.05
Football Vs. Handball	11.738	< 0.05
Football Vs. Rowing	12.579	< 0.05
Football Vs. Taikondo	12,805	< 0.05
Handball Vs. Rowing	12.302	> 0.05
Handball Vs. Taikondo	12.533	> 0.05
Rowing Vs. Taikondo	13.324	> 0.05

Table (13) shows that the ANOVA in recorded pulse rate during recovery after 3 minutes between the studied groups was highly signifcant (P<0.01).
The lowest value belonged to the football team (96.158 ± 16.668) and then for volleyball team (107.333 ± 19.388). The highest value was that for the taikondo team (117.2 ± 7.354) and the rowing team (116.25 ± 27.622)

The LSD test in table (13˜) shows significant difference (P<0.05) between football team vis handball, rowing and taikondo teams.

Table 14 : Analysis of Variance (ANOVA) of recovery pulse rate (in beats/min) after 5 minutes in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	65 - 123	101.333	18.431
Football	19	49 - 109	90.579	15.507
Handball	21	85 - 125	130.571	11.868
Rowing	16	105 - 134	115.500	7.849
Taikondo	15	86 - 139	109.600	13.715
F	8.222			
P	< 0.01			

(14¯) LSD (least significant difference test) for the recovery pulse rate after 5 minutes.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	9.989	< 0.05
Volleyball Vs. Handball	9.803	> 0.05
Volleyball Vs. Rowing	10.345	< 0.05
Volleyball Vs. Taikondo	10.492	> 0.05
Football Vs. Handball	8.578	< 0.05
Football Vs. Rowing	9.192	< 0.05
Football Vs. Taikondo	9.357	< 0.05
Handball Vs. Rowing	8.990	< 0.05
Handball Vs. Taikondo	9.158	> 0.05
Rowing Vs. Taikondo	9.736	> 0.05

Table (14) shows that the ANOVA in recorded pulse rate during recovery after 5 minutes between the studied groups was highly signifcant (P<0.01).
The lowest value belonged to the football team (90.579 ± 15.507) and then for volleyball team (101.333 ± 18.431). The highest value was that of the rowing team (115 ± 7.849).

Table (14¯) shows significant difference (P<0.05) between all groups except volleyball team vis handball team, and taikondo team vis handball and rowing teams.

Table 15 : Analysis of Variance (ANOVA) of V.C. (in liters) in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	5.00 - 6.81	5.814	0.571
Football	19	3.13 - 6.24	4.956	0.738
Handball	21	4.38 - 6.38	5.500	0.609
Rowing	16	4.24 - 6.25	5.461	0.557
Taikondo	16	3.75 - 8.30	5.360	1.185
F	2.581			
P	< 0.05			

(15¯) LSD (least significant difference test) for V.C.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	0.563	< 0.05
Volleyball Vs. Handball	0.553	> 0.05
Volleyball Vs. Rowing	0.583	> 0.05
Volleyball Vs. Taikondo	0.583	> 0.05
Football Vs. Handball	0.484	< 0.05
Football Vs. Rowing	0.518	> 0.05
Football Vs. Taikondo	0.518	> 0.05
Handball Vs. Rowing	0.507	> 0.05
Handball Vs. Taikondo	0.507	> 0.05
Rowing Vs. Taikondo	0.540	> 0.05

Table (15) shows that the ANOVA in VC between the studied groups was signifcant (P<0.05).
It is apparent that volleytball players had the higher vital capacity values (5.814 ± 0.571) than the other groups, the football players had the lowest vlaue (4.956 ± 0.738).

Table (15¯) shows significant difference (P<0.05) only between football team vis volleyball and handball teams.

Table 16 : Analysis of Variance (ANOVA) of FEV_1 (in liters) in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	2.91 - 5.58	4.335	0.870
Football	19	2.83 - 5.57	4.272	0.599
Handball	21	3.93 - 5.55	4.726	0.518
Rowing	16	3.92 - 5.09	4.572	0.407
Taikondo	16	3.40 - 7.24	4.435	1.090
F	1.228			
P	> 0.05			

Table (16) shows that the ANOVA in FEV_1 between the studied groups was insignifcant (P>0.05).
Although the results were statistically insignificant, the handball team had the highest value and the football team had the lowest vlaue.

Table 17 : Analysis of Variance (ANOVA) of FVC (in liters) in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	4.41 - 7.06	5.714	0.571
Football	19	3.46 - 6.72	5.015	0.738
Handball	21	4.42 - 6.45	5.639	0.609
Rowing	16	4.55 - 6.25	5.456	0.557
Taikondo	16	3.89 - 8.21	5.201	1.185
F	2.549			
P	< 0.05			

(17*) LSD (least significant difference test) for FVC.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	0.555	< 0.05
Volleyball Vs. Handball	0.545	> 0.05
Volleyball Vs. Rowing	0.575	> 0.05
Volleyball Vs. Taikondo	0.575	> 0.05
Football Vs. Handball	0.477	< 0.05
Football Vs. Rowing	0.511	> 0.05
Football Vs. Taikondo	0.511	> 0.05
Handball Vs. Rowing	0.500	> 0.05
Handball Vs. Taikondo	0.500	> 0.05
Rowing Vs. Taikondo	0.533	> 0.05

Table (17) shows that the ANOVA in FVC between the studied groups was signifcant (P<0.05).
The results show that volleytball team then the handball team had the higher values while the lowest vlaue belonged to the football team.

Table (17*) shows significant difference (P<0.05) only between football team vis volleyball and handball teams.

Table 18 : Analysis of Variance (ANOVA) of $FEV_1/FVC\%$ in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	53 - 88	75.771	10.844
Football	19	71 - 93	85.750	8.128
Handball	21	71 - 93	84.029	5.644
Rowing	16	78 - 92	83.894	4.279
Taikondo	16	71 - 95	84.973	7.104
F	4.068			
P	< 0.01			

(18*) LSD (least significant difference test) for FEV_1/FVC %.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	5.321	< 0.05
Volleyball Vs. Handball	5.222	< 0.05
Volleyball Vs. Rowing	5.511	< 0.05
Volleyball Vs. Taikondo	5.511	< 0.05
Football Vs. Handball	4.569	> 0.05
Football Vs. Rowing	4.896	> 0.05
Football Vs. Taikondo	4.896	> 0.05
Handball Vs. Rowing	4.789	> 0.05
Handball Vs. Taikondo	4.789	> 0.05
Rowing Vs. Taikondo	5.102	> 0.05

Table (18) shows that the ANOVA in FEV_1 /FVC between the studied groups was insignifcant (P>0.05).
The volleyball team had the lowest value, while the football team had the highest vlaue.

Table (18*) shows significant variations (P<0.05) between volleyball team and otehr teams.

Table 19 : Analysis of Variance (ANOVA) of peak expiratory flow (PEF) (liters/sec) in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	226 - 609	469.250	160.921
Football	19	328 - 733	549.158	105.739
Handball	21	440 - 766	590.000	99.752
Rowing	16	429 - 710	572.188	80.506
Taikondo	16	372 - 921	527.125	159.426
F	2.170			
P	< 0.05			

(19¯) LSD (least significant difference test) for FMET.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	89.083	> 0.05
Volleyball Vs. Handball	87.425	< 0.05
Volleyball Vs. Rowing	92.259	< 0.05
Volleyball Vs. Taikondo	92.259	> 0.05
Football Vs. Handball	76.493	> 0.05
Football Vs. Rowing	81.974	> 0.05
Football Vs. Taikondo	81.974	> 0.05
Handball Vs. Rowing	80.170	> 0.05
Handball Vs. Taikondo	80.170	> 0.05
Rowing Vs. Taikondo	85.415	> 0.05

Table (19) shows that the ANOVA in the values of PEF between the studied groups was signifcant (P<0.05).
The highest value belonged to the handball team, while the lowest vlaue was for the volleyball team.

Table (19¯) shows significant difference (P<0.05) only between volleyball team vis handball and rowing teams.

Table 20 : Analysis of Variance (ANOVA) of forced midexpiratory flow (FMEF) (in liters/sec) in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	2.25 - 5.66	4.078	1.250
Football	19	2.76 - 6.78	4.651	1.188
Handball	21	2.90 - 7.45	4.985	1.189
Rowing	16	3.64 - 6.63	4.726	0.897
Taikondo	16	2.22 - 8.36	4.863	1.790
F	1.029			
P	> 0.05			

Table (20) shows that the ANOVA in the values of FMEF between the studied groups was insignifcant (P>0.05).
However, the handball team had the highest value, while the volleyball team had the lowest.

Table 21 : Analysis of Variance (ANOVA) of forced midexpiratory flow time (FMET) (in seconds) in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	0.51 - 1.12	0.751	0.214
Football	19	0.34 - 0.96	0.562	0.147
Handball	21	0.38 - 1.02	0.591	0.160
Rowing	16	0.42 - 0.73	0.588	0.093
Taikondo	16	0.37 - 1.08	0.581	0.183
F	2.997			
P	< 0.05			

(20¯) LSD (least significant difference test) for FMET.

Comparison	Fischer LSD	P value
Volleyball Vs. Football	0.118	< 0.05
Volleyball Vs. Handball	0.116	< 0.05
Volleyball Vs. Rowing	0.122	< 0.05
Volleyball Vs. Taikondo	0.122	< 0.05
Football Vs. Handball	0.101	> 0.05
Football Vs. Rowing	0.108	> 0.05
Football Vs. Taikondo	0.108	> 0.05
Handball Vs. Rowing	0.106	> 0.05
Handball Vs. Taikondo	0.106	> 0.05
Rowing Vs. Taikondo	0.113	> 0.05

Table (21) shows that the ANOVA in FMET between the studied groups was signifcant (P<0.05).
The volleyball team had the highest value, while the football team had the lowest vlaue.

Table (21¯) shows significant variations (P<0.05) between volleyball team and otehr teams.

Table 22 : Analysis of Variance (ANOVA) of MVV index (in liters/min) in the studied groups.

Type of Sport	No	Range	Mean	S.D.
Volleyball	12	135 - 209	162.500	32.606
Football	19	106 - 209	158.421	25.297
Handball	21	147 - 208	177.238	19.498
Rowing	16	147 - 191	171.438	15.249
Taikondo	16	128 - 272	166.312	40.992
F	1.369			
P	> 0.05			

Table (22) shows that the ANOVA in MVV index between the studied groups was insignifcant (P>0.05).
It is apparent that handtball and rowing teams had the highest values of MVV than the other groups. Football players showed the lowest vlaue.

Table (23) : Correlation between $Vo_{2\,max}$ of all players of all groups with weight, resting pulse, maximum pulse, recovery pulse, examination time and MVV index.

No. of players: 84

Variable	Mean	S.D.	r	P
$Vo_{2\,max}$	3.145	0.790		
Wt.	79.893	10.237	0.061	> 0.05
Resting pulse	79.595	14.671	-0.123	> 0.05
Maximum pulse	179.44	13.924	0.039	> 0.05
Rec1	137.084	17.970	0.226	> 0.05
Rec3	109.217	19.798	- 0.014	> 0.05
Rec5	103.663	15.822	0.069	> 0.05
Exam. time	13.768	5.120	0.126	> 0.05
MVV index	167.690	27.689	- 0.005	> 0.05

There was no significant correlation.

Table (24) : Correlation between $Vo_{2\,max}$ of volleyball players with weight, resting pulse, maximum pulse, recovery pulse, examination time and MVV index.

No. of players: 12

Variable	Mean	S.D.	r	P
$Vo_{2\,max}$	3.251	0.554		
Wt.	81.000	6.915	0.527	> 0.05
Resting pulse	82.500	14.927	0.192	> 0.05
Maximum pulse	174.000	19.628	0.424	> 0.05
Rec1	128.583	27.923	0.652	< 0.05
Rec3	107.333	19.388	0.652	< 0.05
Rec5	101.333	18.431	0.555	< 0.05
Exam. time	17.708	3.523	0.510	> 0.05
MVV index	162.500	32.606	0.354	> 0.05

There was significant correlation with Rec1, Rec3 & Rec5.

Table (25) : Correlation between Vo_2 max of football players with weight, resting pulse, maximum pulse, recovery pulse, examination time and MVV index.

No. of players: 19

Variable	Mean	S.D.	r	P
Vo_2 max	3.456	0.575		
Wt.	74.684	6.929	0.056	> 0.05
Resting pulse	63.526	8.890	0.112	> 0.05
Maximum pulse	168.895	13.345	0.201	> 0.05
Rec1	125.947	14.246	0.392	> 0.05
Rec3	96.158	16.668	0.169	> 0.05
Rec5	90.579	15.507	0.119	> 0.05
Exam. time	5.579	1.669	0.345	> 0.05
MVV index	158.421	25.297	0.256	> 0.05

There was no significant correlation.

Table (26) : Correlation between $Vo_{2\,max}$ of handball players with weight, resting pulse, maximum pulse, recovery pulse, examination time and MVV index.

No. of players: 21

Variable	Mean	S.D.	r	P
$Vo_{2\,max}$	2.632	0.760		
Wt.	86.048	10.524	- 0.004	> 0.05
Resting pulse	83.095	14.082	- 0.626	> 0.05
Maximum pulse	180.429	10.510	0.052	> 0.05
Rec1	139.048	14.347	0.276	> 0.05
Rec3	111.048	10.595	0.110	> 0.05
Rec5	103.571	15.822	-0.049	> 0.05
Exam. time	14.738	2.131	0.823	< 0.01
MVV index	177.238	19.498	-0.124	> 0.05

There was highly significant correlation with examination time.

Table (27) : Correlation between Vo_2 max of rowing players with weight, resting pulse, maximum pulse, recovery pulse, examination time and MVV index.

No. of players: 16

Variable	Mean	S.D.	r	P
Vo_2 max	3.631	0.708		
Wt.	84.562	9.388	0.359	> 0.05
Resting pulse	88.125	9.972	0.508	< 0.05
Maximum pulse	190.438	6.398	0.002	> 0.05
Rec1	147.438	12.956	0.315	> 0.05
Rec3	116.250	27.623	-0.293	< 0.05
Rec5	115.500	7.849	0.148	> 0.05
Exam. time	16.688	2.097	0.639	< 0.01
MVV index	171.438	15.249	-0.105	> 0.05

There was significant correlation with resting pulse and Rec3, and highly significant correlation with examination time.

Table (28) : Correlation between Vo_2 max of taikondo players with weight, resting pulse, maximum pulse, recovery pulse, examination time and MVV index.

No. of players: 16

Variable	Mean	S.D.	r	P
Vo_2 max	2.929	0.870		
Wt.	72.500	9.026	0.231	> 0.05
Resting pulse	83.375	11.138	0.048	> 0.05
Maximum pulse	183.750	8.583	0.113	> 0.05
Rec1	144.200	11.453	0.144	> 0.05
Rec3	117.200	17.354	0.027	> 0.05
Rec5	109.600	13.715	-0.094	> 0.05
Exam. time	16.344	2.694	0.701	< 0.01
MVV index	166.312	40.992	0.079	> 0.05

There was highly significant correlation with examination time.

Table (29) : Stepwise regression analysis for $Vo_{2\,max}$.

Variable	Coefficient	Std Err.	F to remove
Intercept	2.440		
Pulse rest	-0.016	0.007	4.911
Rec 1	0.017	0.006	7.863
Rec 3	-0.006	0.006	1.258
Exam time	0.026	0.190	1.876

By the stepwise regression analysis for $Vo_{2\,max}$, the values that found to enter the equation were resting pulse, Rec1, Rec3, and examination time, and this in order of their importance.

On the other hand, the variables which were not in the equation, i.e. they do not influence VO2max, were age, weight, height, Rec.5, VC, FVC, FEV_1, FMEF, PEF, MVV index, FMFT, FEV_1/FEVC%, and the maximum pulse rate.

Table (30) : Multiple regression analysis for Vo_2 max.

Variable	Coeff.	Std Err	t value	propab
Intercept	2.440 (α)			
Pulse rest	-0.016 (B1)	0.007	2.216	0.0296
Rec. 1	0.017 (B2)	0.006	2.804	0.0064
Rec. 3	-0.006 (B3)	0.006	1.121	0.2655
Exam time	0.026 (B4)	0.019	1.370	0.1747

Coeff.: Coefficient, Std Err.: Standard Error, and propab.: propability.

The multiple regression analysis prediction equation is

$$Y = \alpha + B_1X_1 + B_2X_2 + B_3X_3 \ldots + B_nX_n$$

According to the multiple regression analysis predictive value for Vo_2 max can be calculated as follows :

$$VO_2max = \alpha + (B_1 \times \text{Pulse rest}) + (B_2 \times \text{Rec.1}) + (B_3 \times \text{Rec.3}) + (B_4 \times \text{Exam time})$$

$$VO_2max = 2.44 + (-0.016 \times \text{Pulse rest}) + (0.017 \times \text{Rec.1}) + (-0.006 \times \text{Rec.3}) + (0.026 \times \text{Exam time})$$

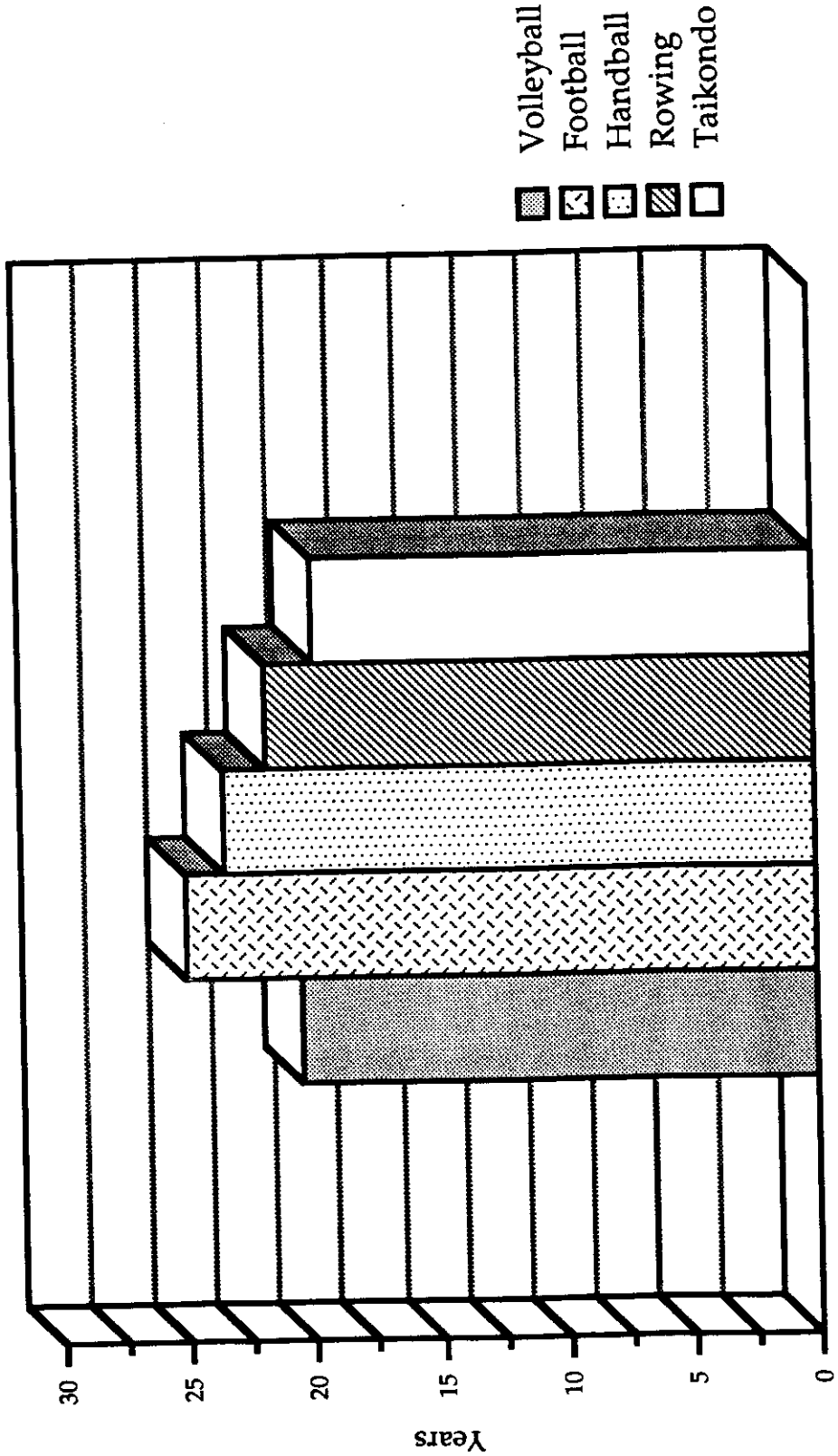

Fig. (3) Ages of the studied groups in years

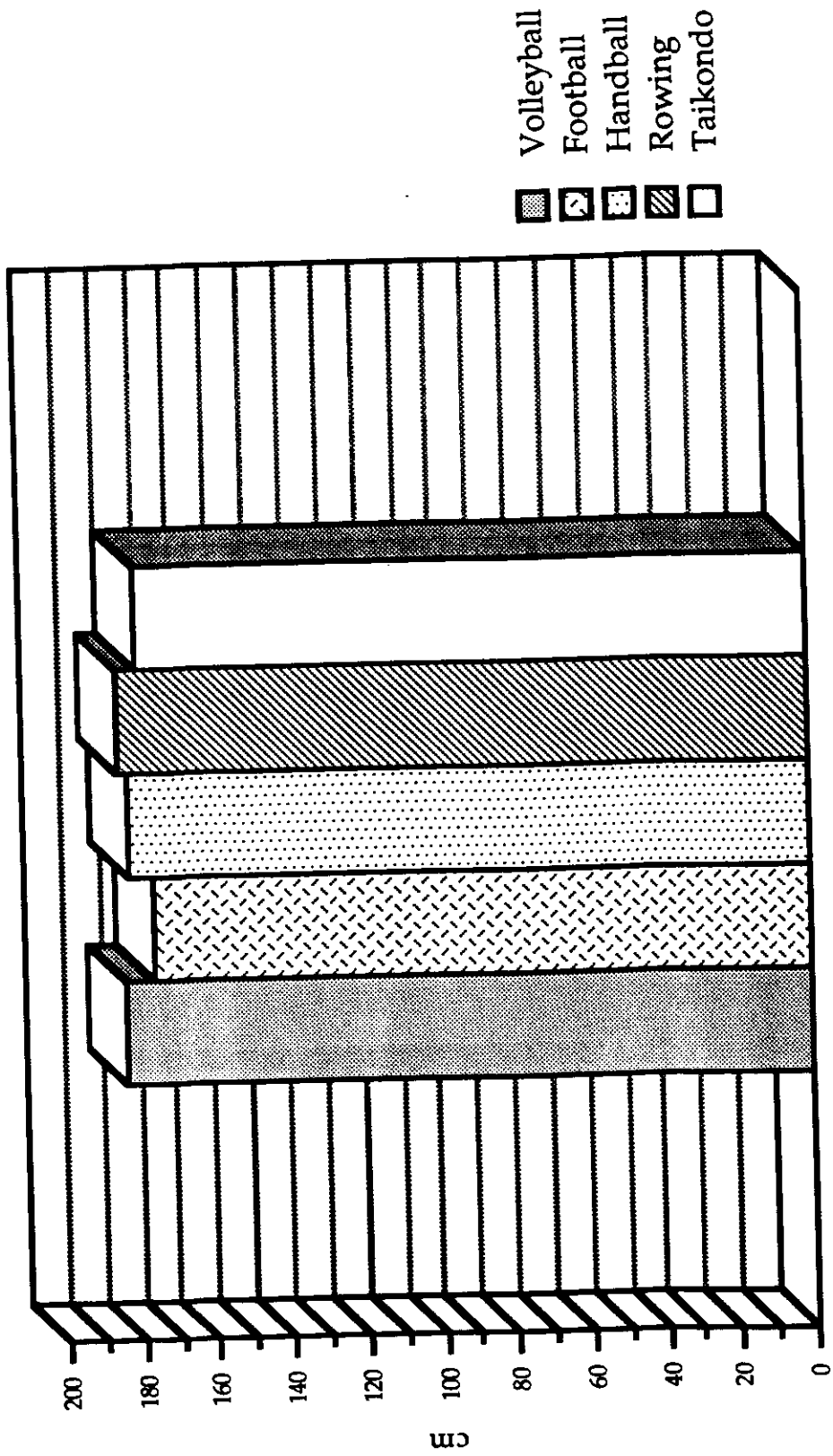

Fig. (4) Height of the studied groups in cm

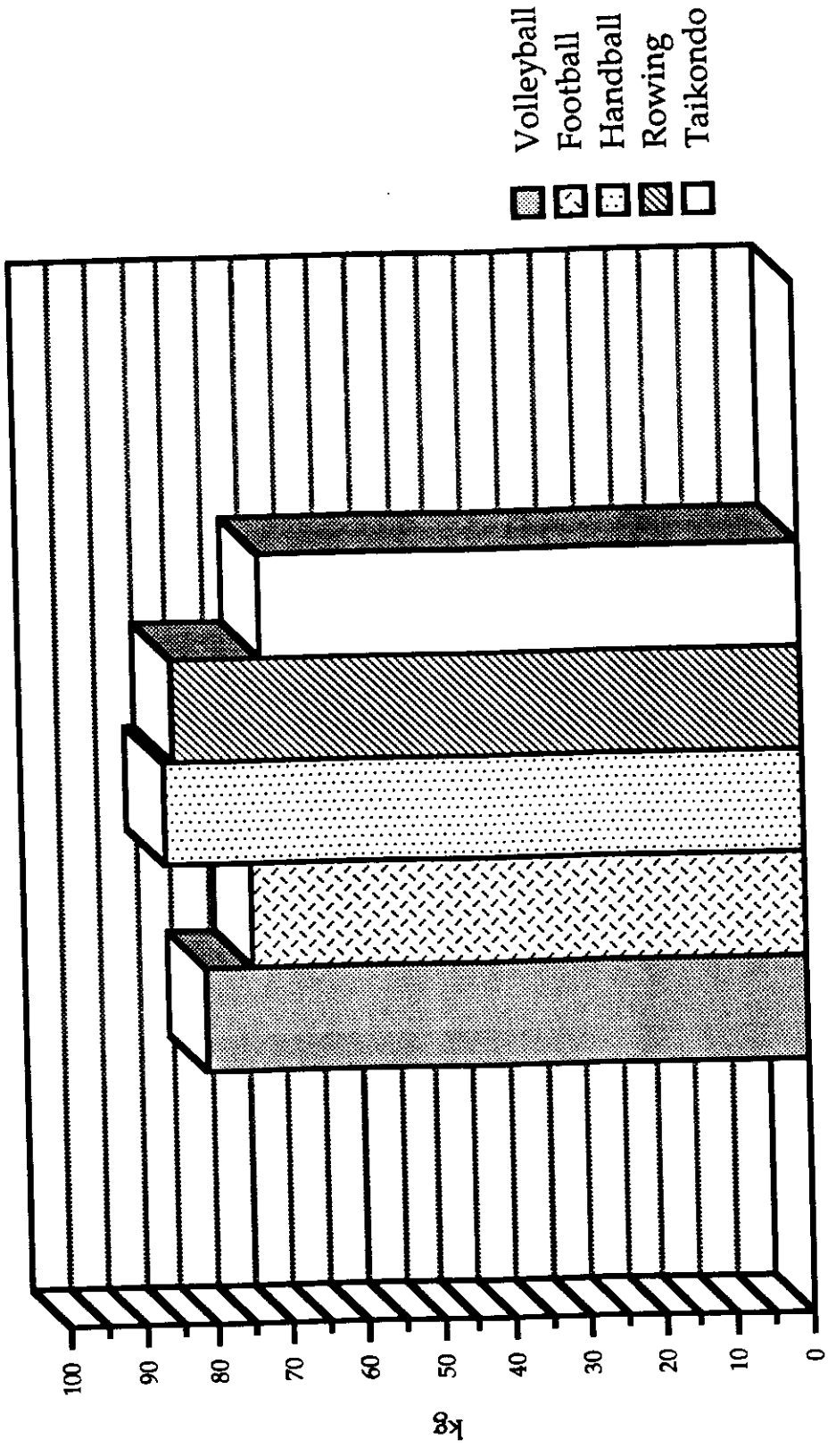

Fig. (5) Weight of the studied groups in Kg.

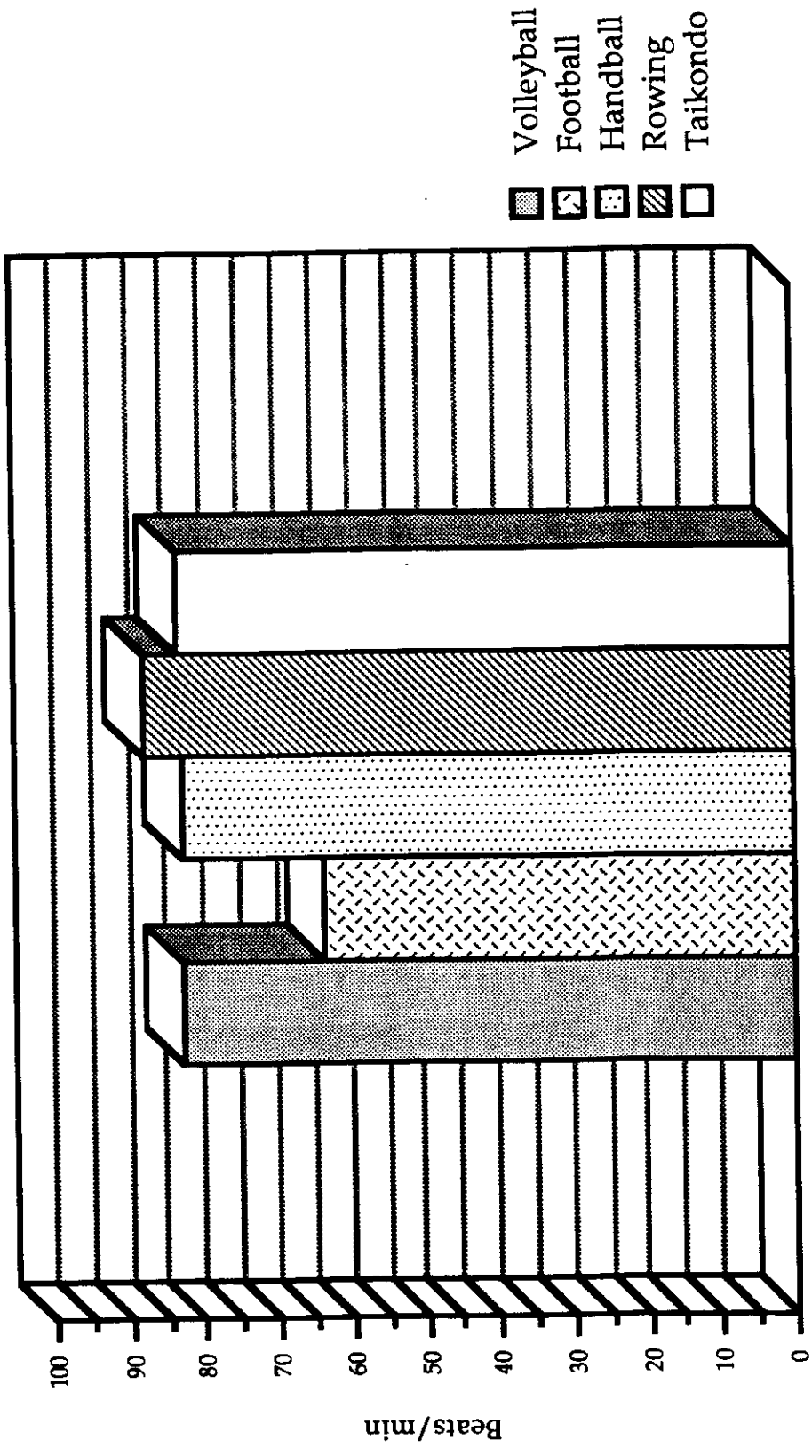

Fig. (6) Resting pulse of the studied groups (beats/min).

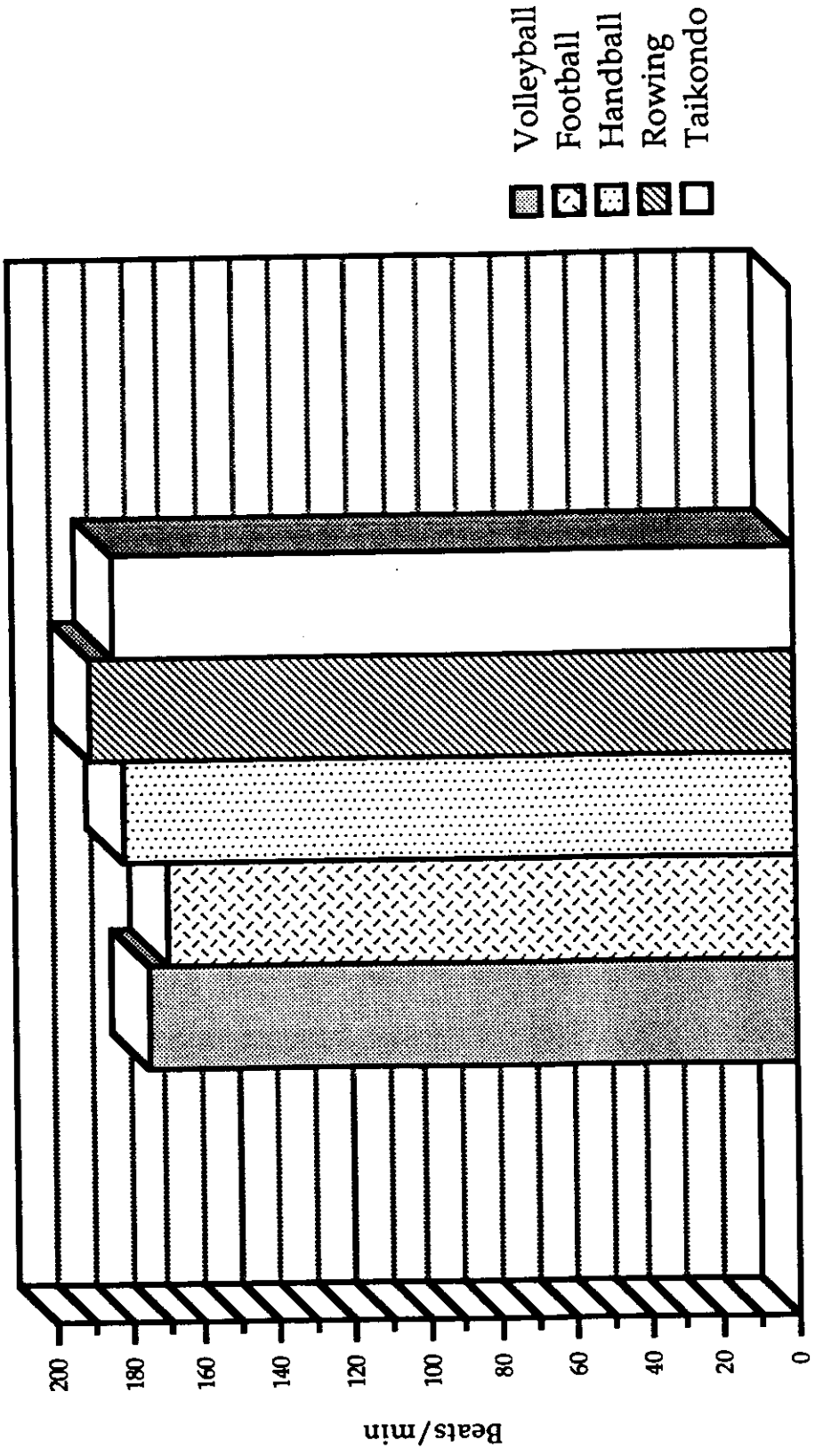

Fig. (7) Maximum pulse rate (beats/min) for the studied groups.

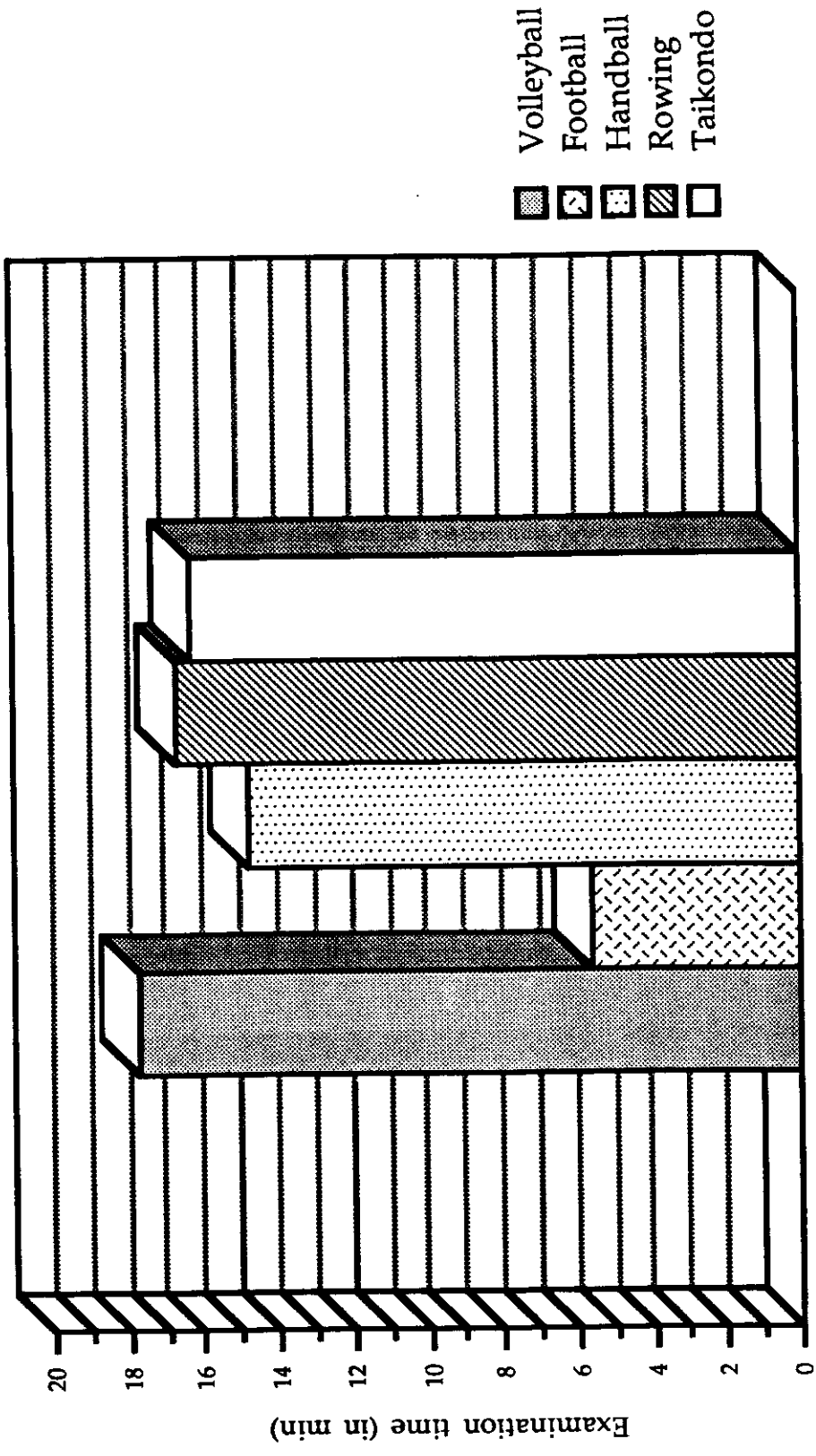

Fig. (8) Examination time (in min) for the studied groups.

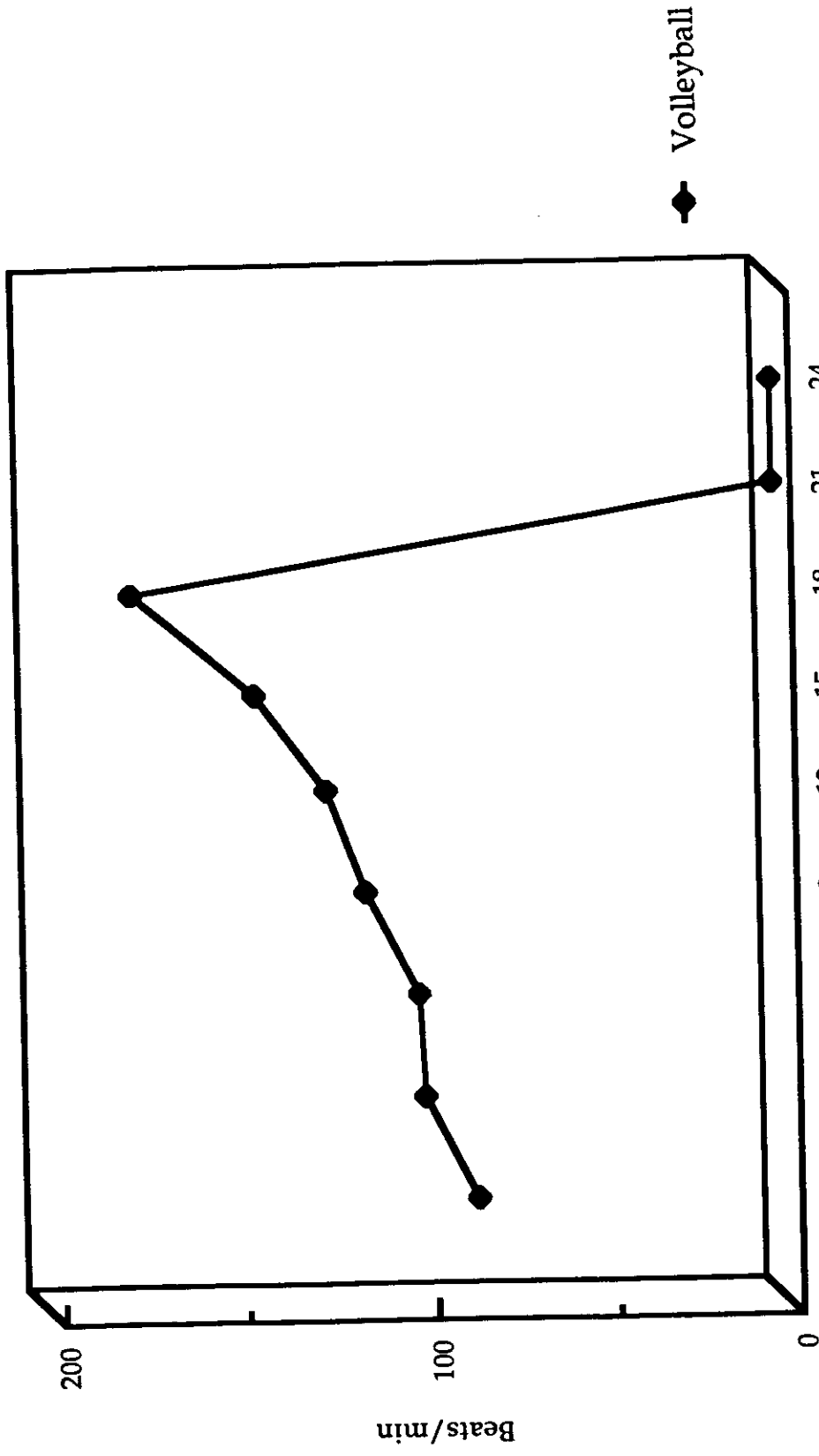

Fig. (9) Changes of heart rate during the test for Volleyball team
The maximum pulse rate is reached at about the 21st min.

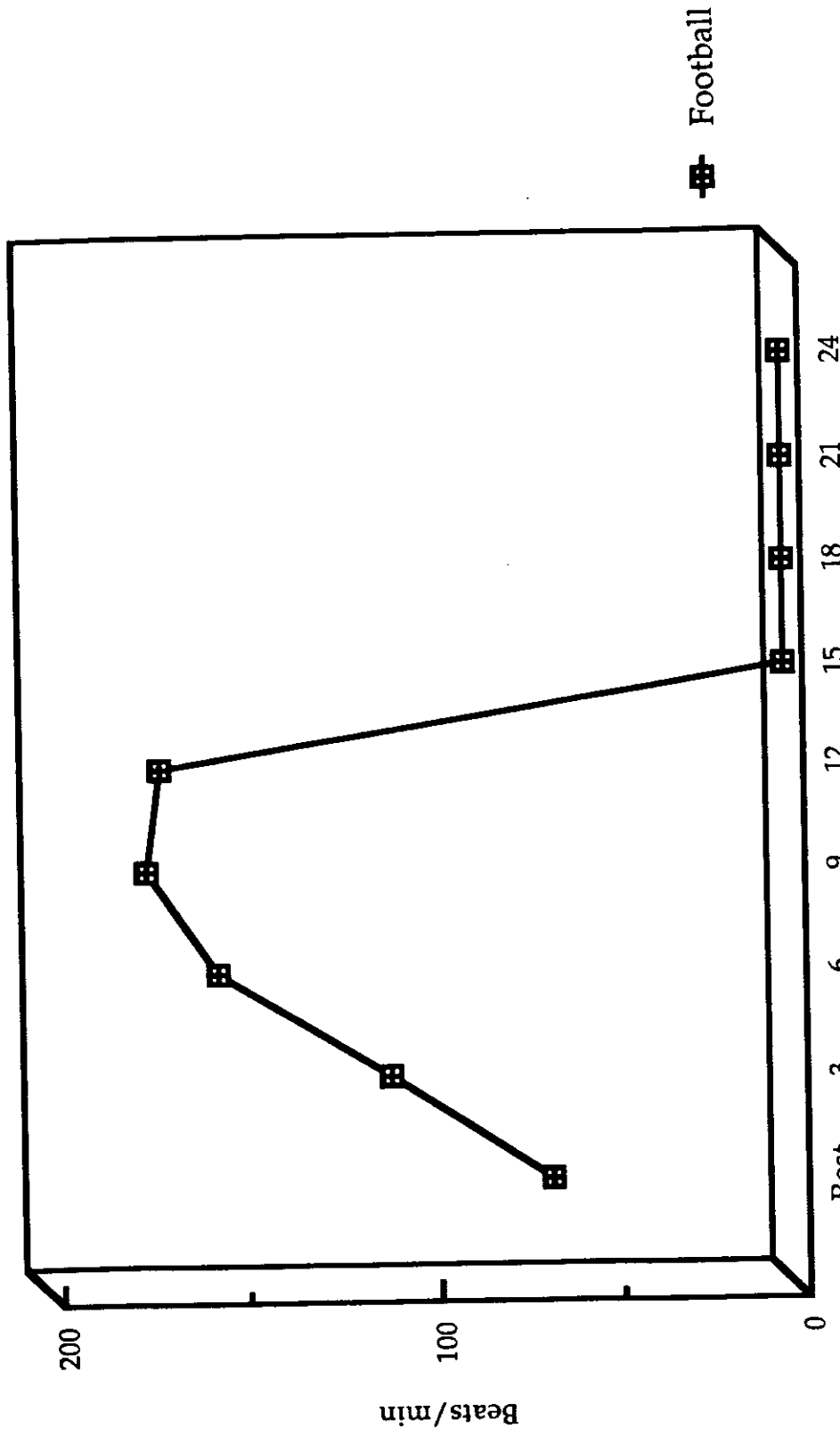

Fig. (10) Changes of heart rate during the test for Football team
The maximum pulse rate is reached at about the 11th min.

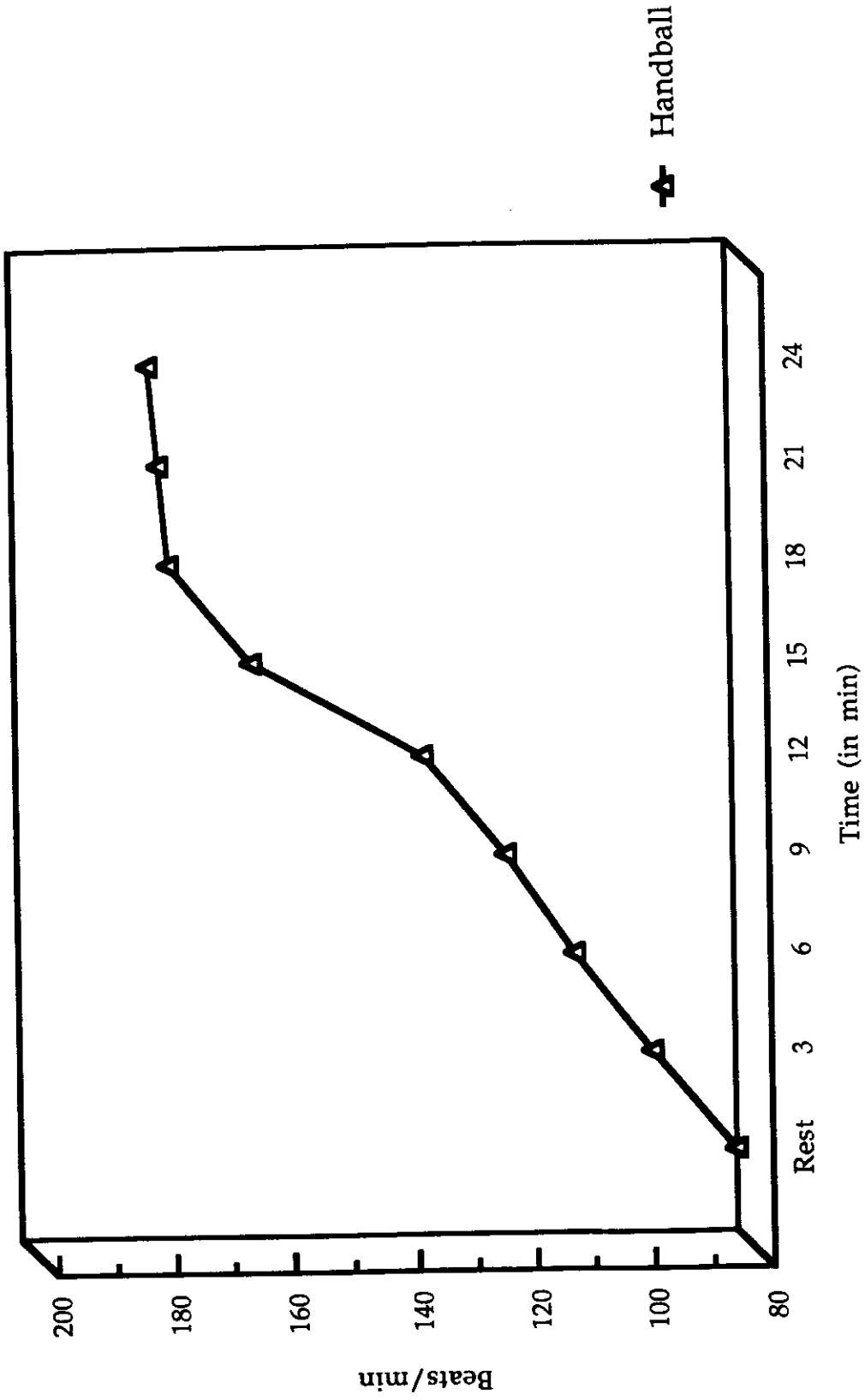

Fig. (11) Changes of heart rate during the test for Handball team
The maximum pulse rate is reached at about the 24th min.

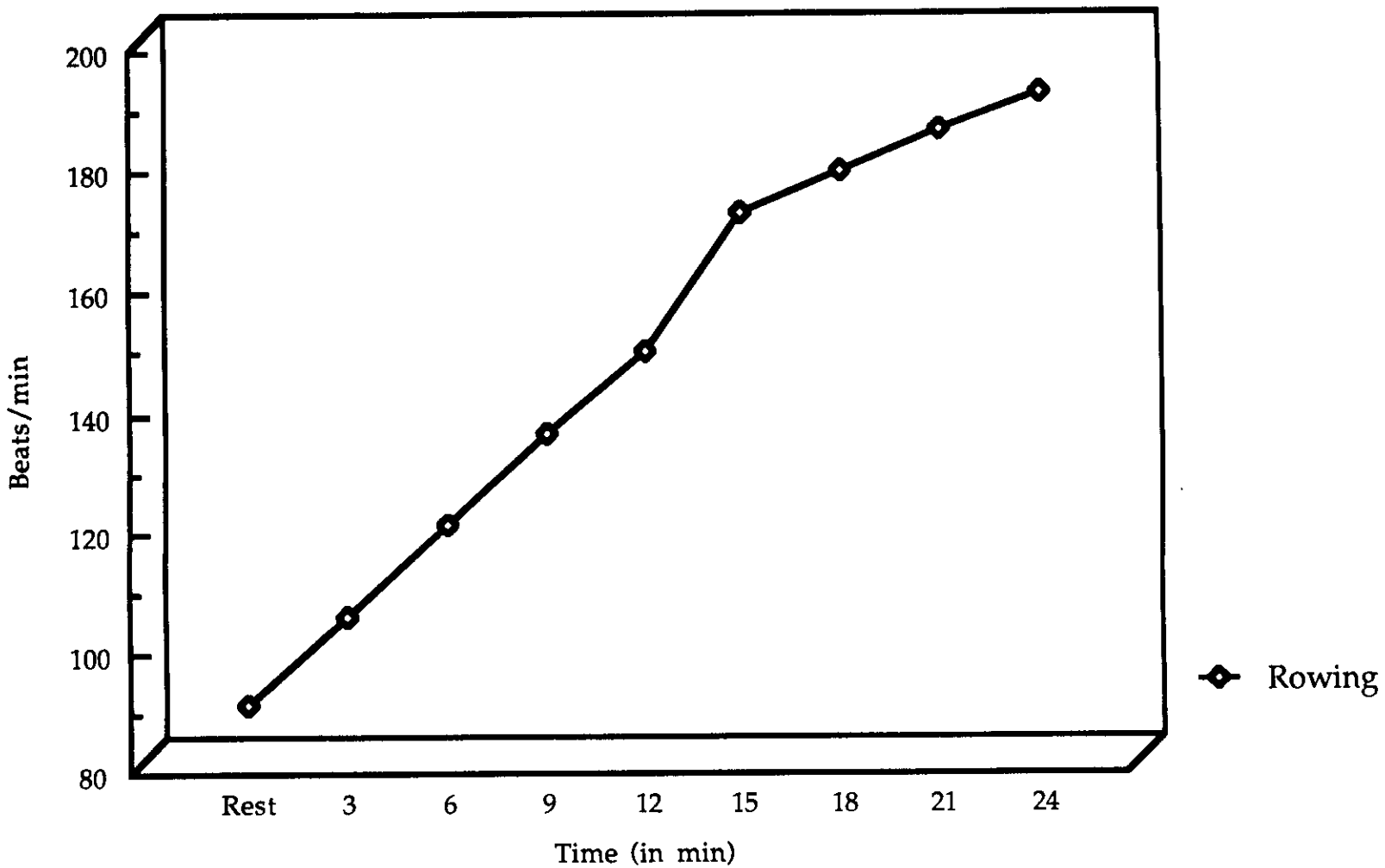

Fig. (12) Changes of heart rate during the test for Rowing team
The maximum pulse rate is reached at about the 24th min.

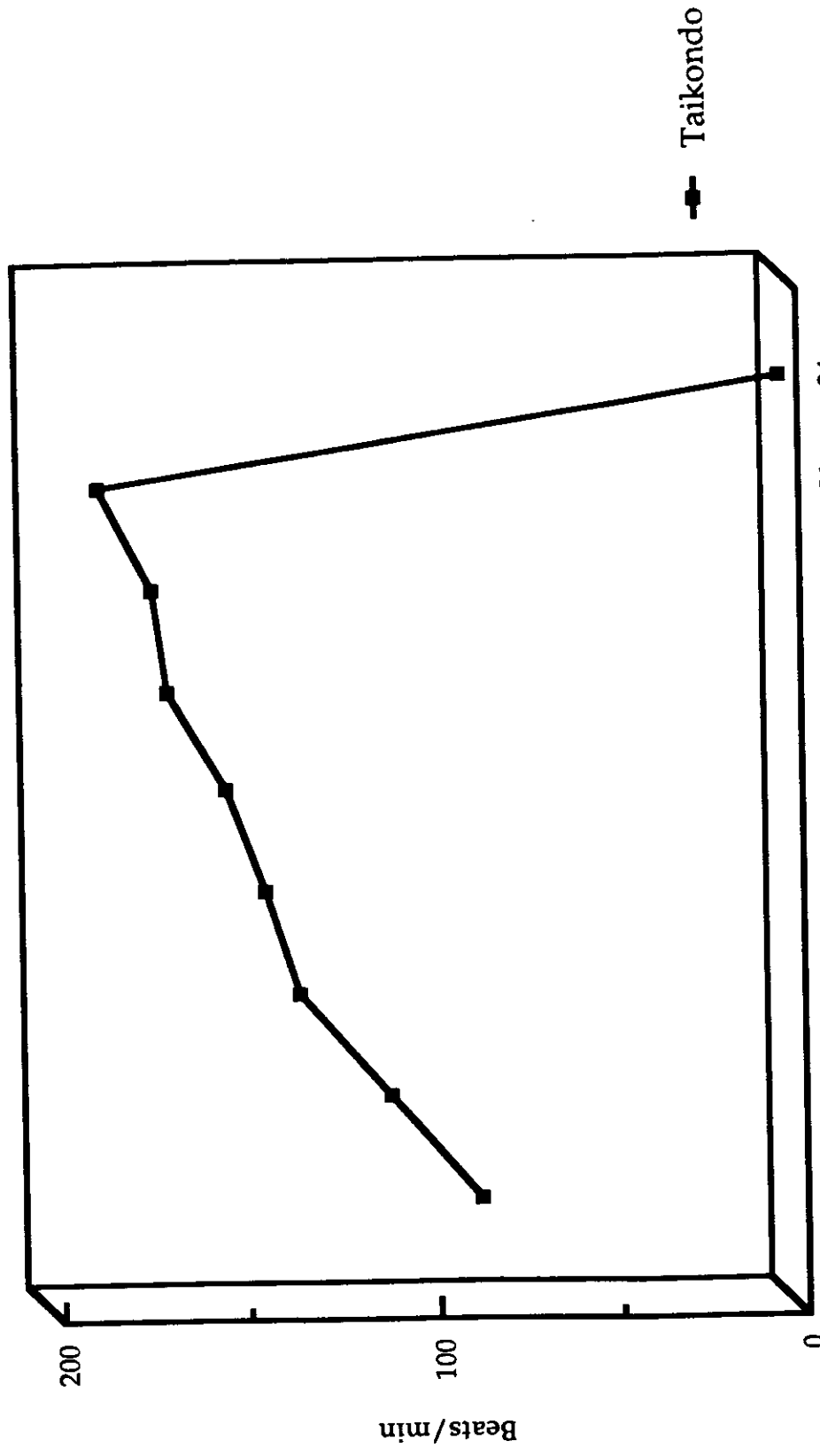

Fig. (13) Changes of heart rate during the test for Taikondo team
The maximum pulse rate is reached at about the 24th min.

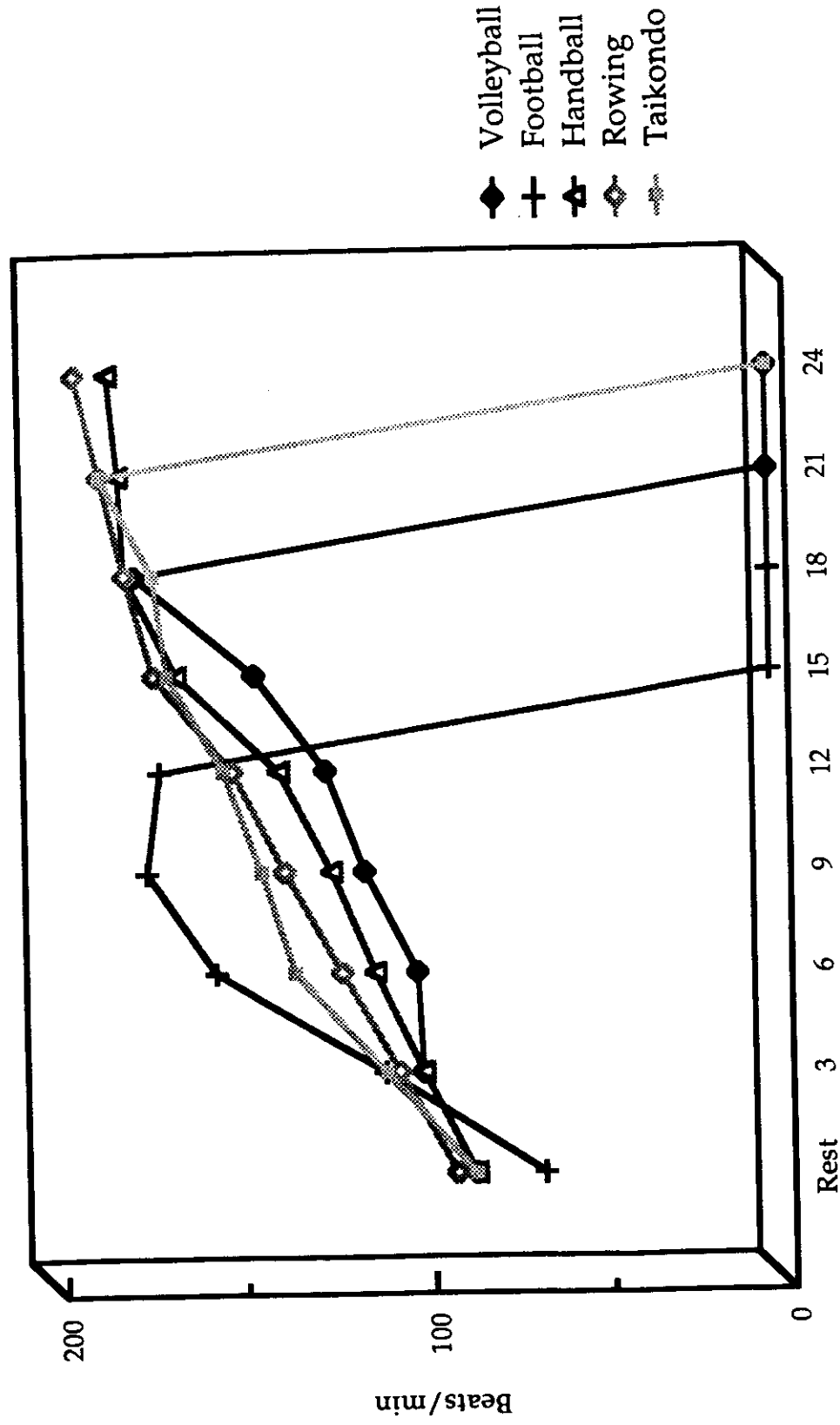

Fig. (14) Changes of heart rate during the test for all groups
The Football team have the lowest resting pulse and it reached the maximum heart rate very early than others.

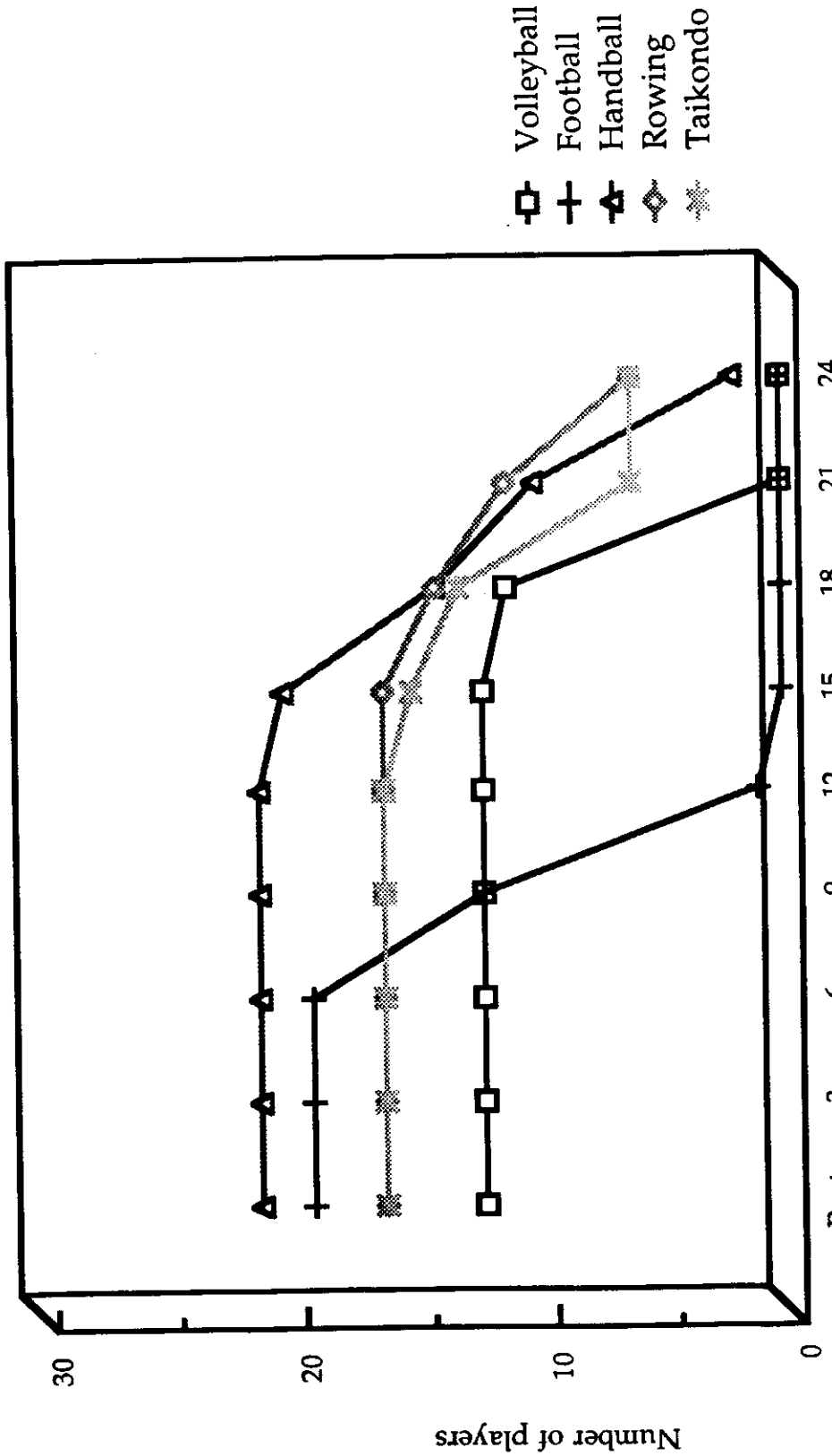

Fig. (15) Number of players and the examination time.
The Football team could not continue the test program, while the other teems wre better. Volleyball team was the best one.

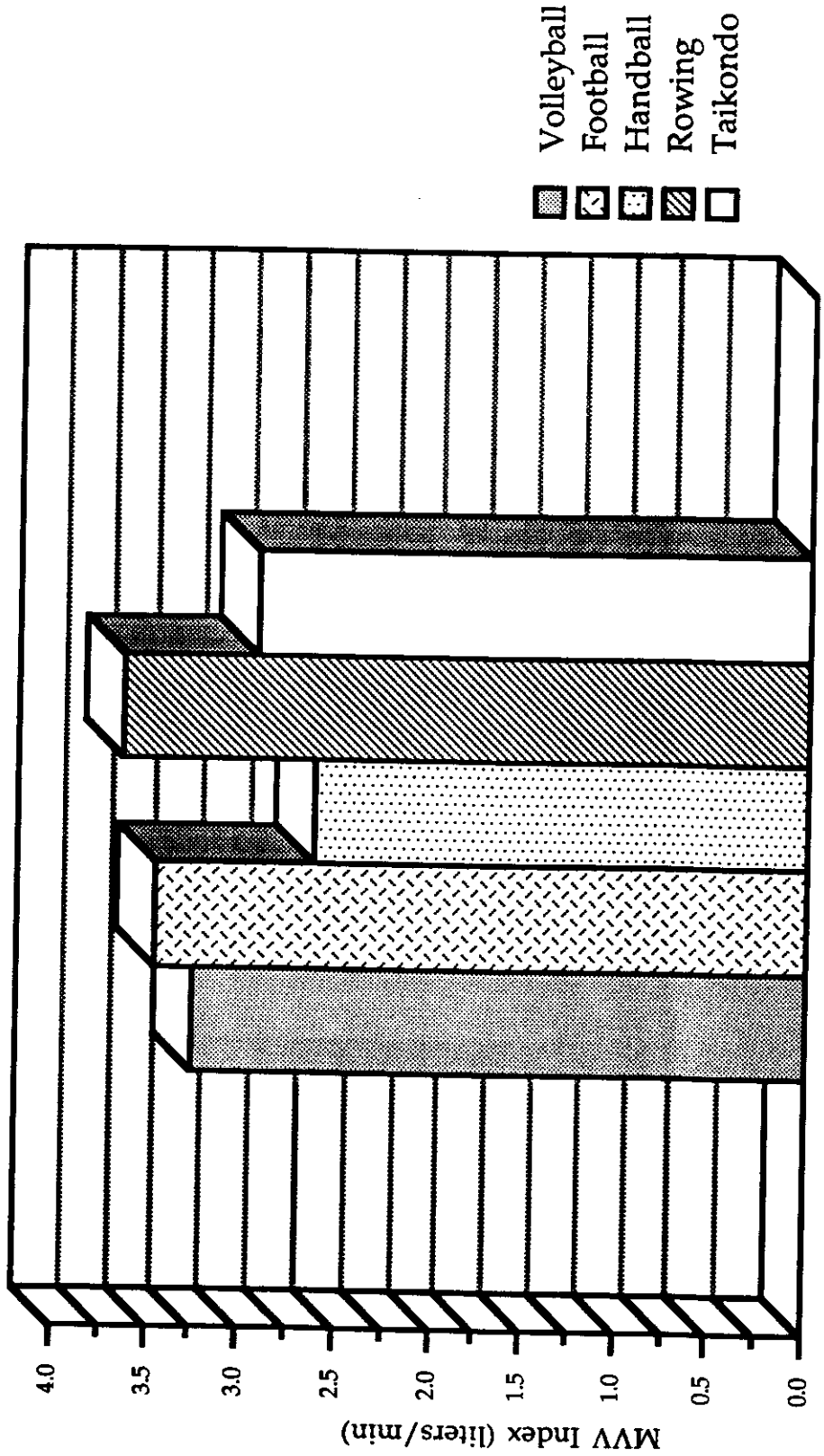

Fig. (16) VO2max (liters/min) for the studied groups.

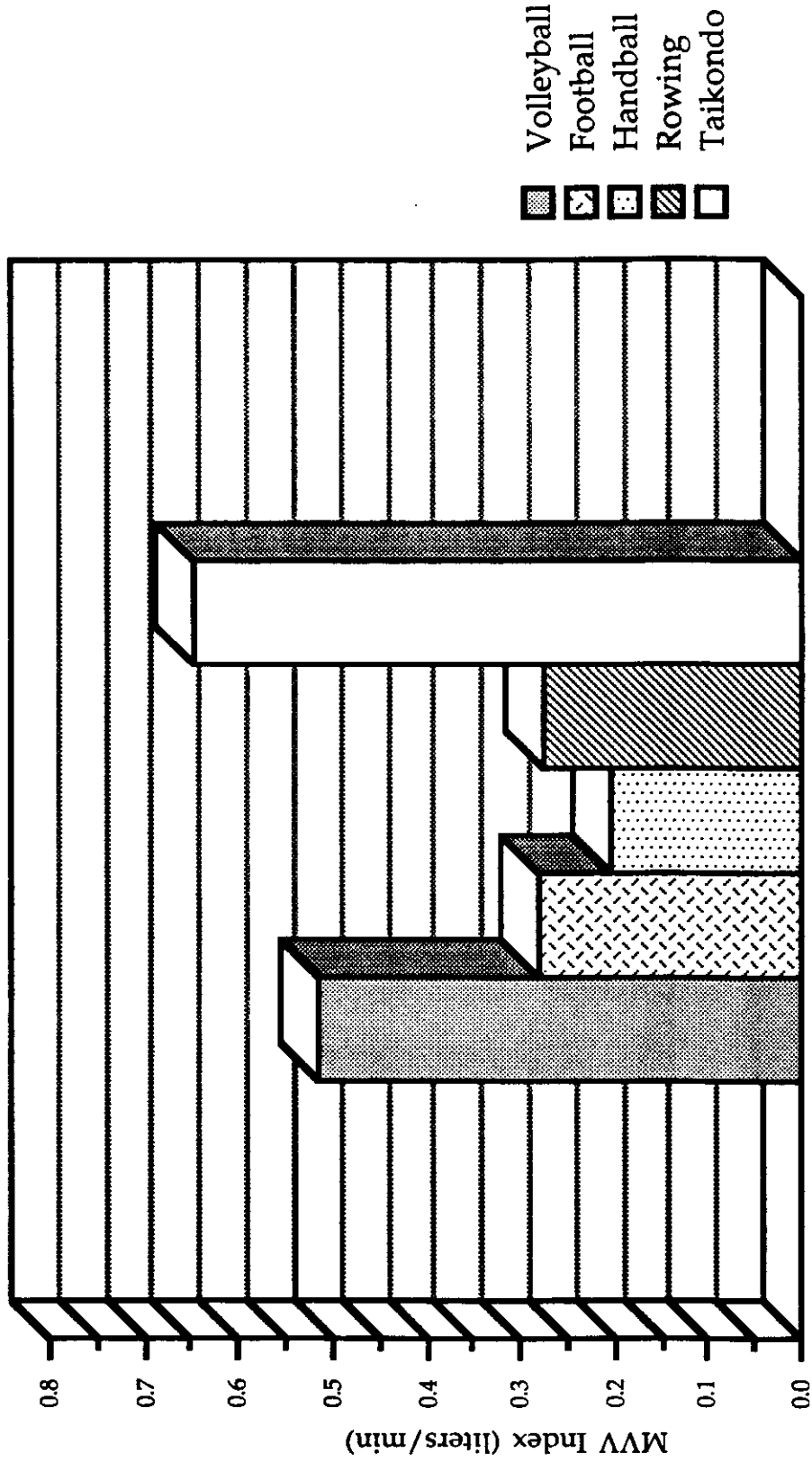

Fig. (17) VO_2 (liters/min) at watt 30 (warm up period) for the studied groups.

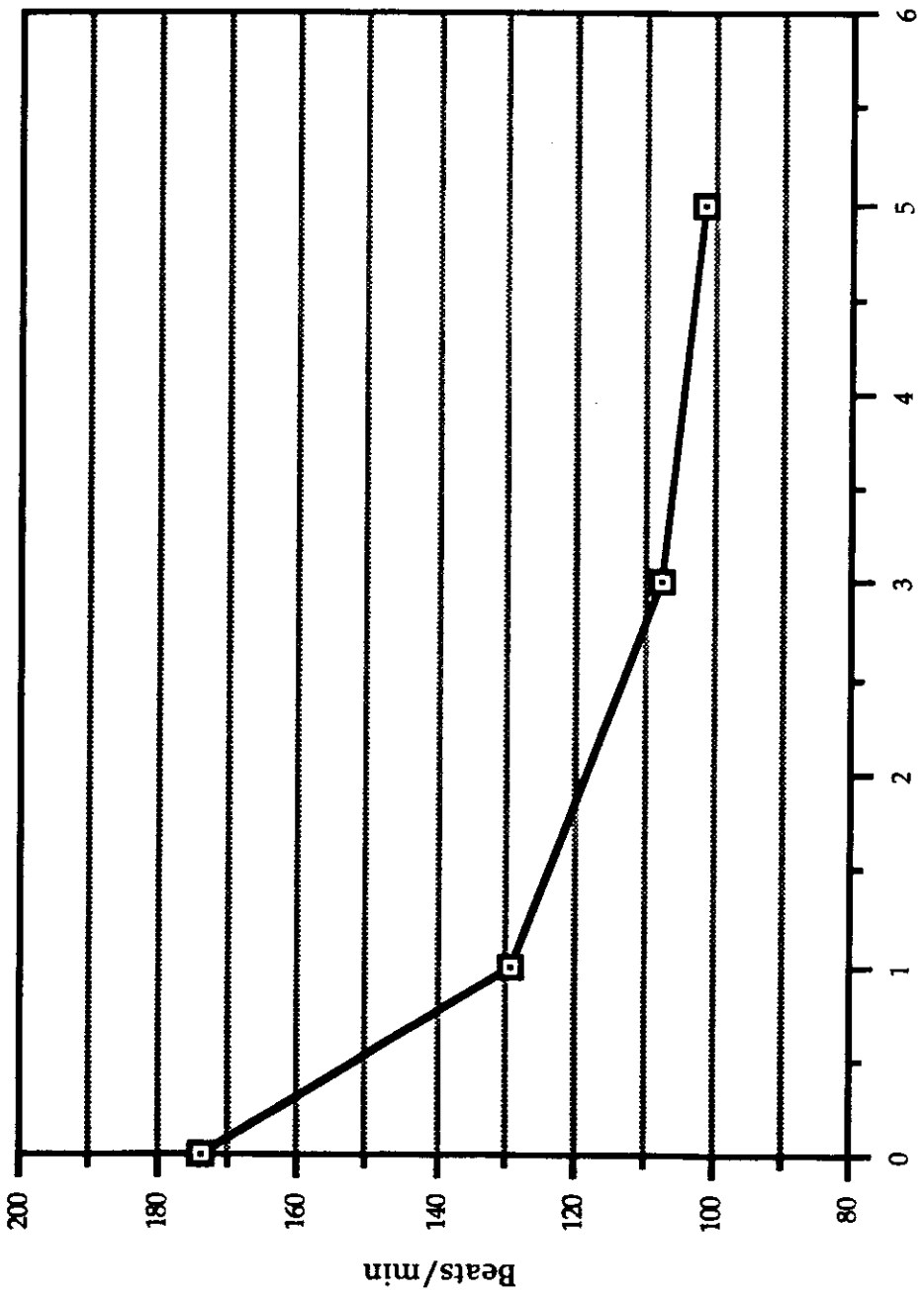

Fig. (18) Recovery heart rate for Volleyball team.

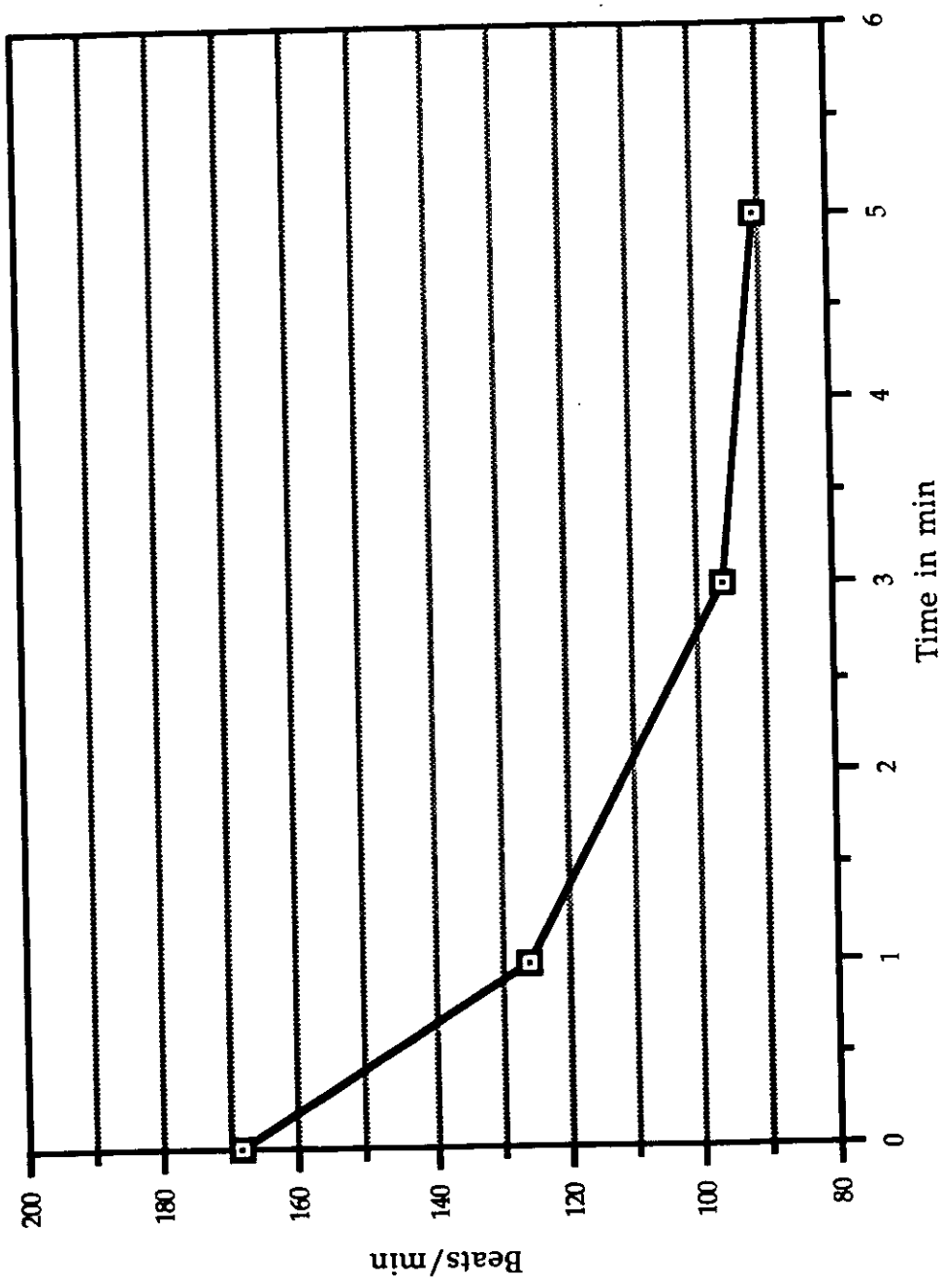

Fig. (19) Recovery heart rate for Football team.

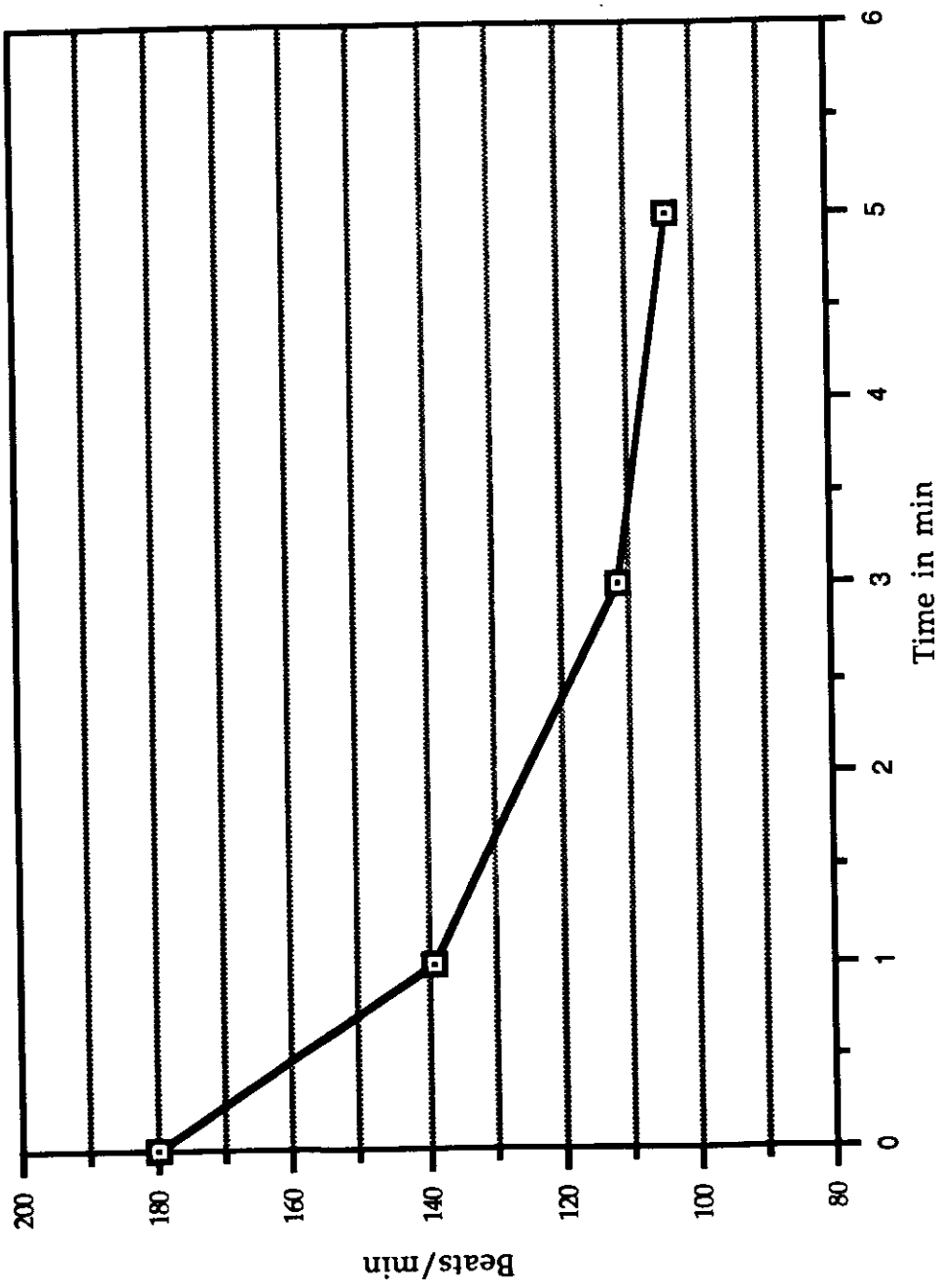

Fig. (20) Recovery heart rate for Handball team.

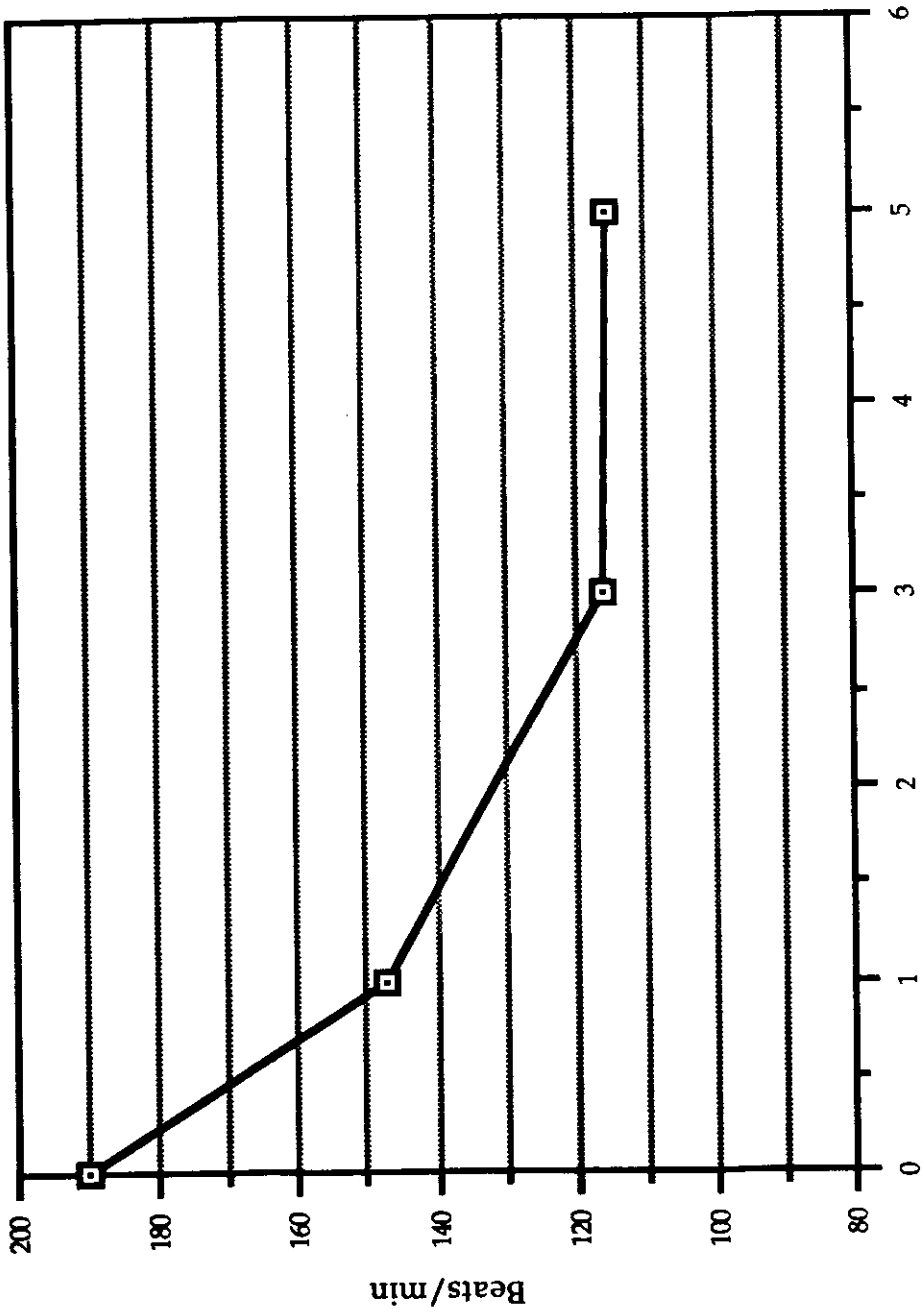

Fig. (21) Recovery heart rate for Rowing team.

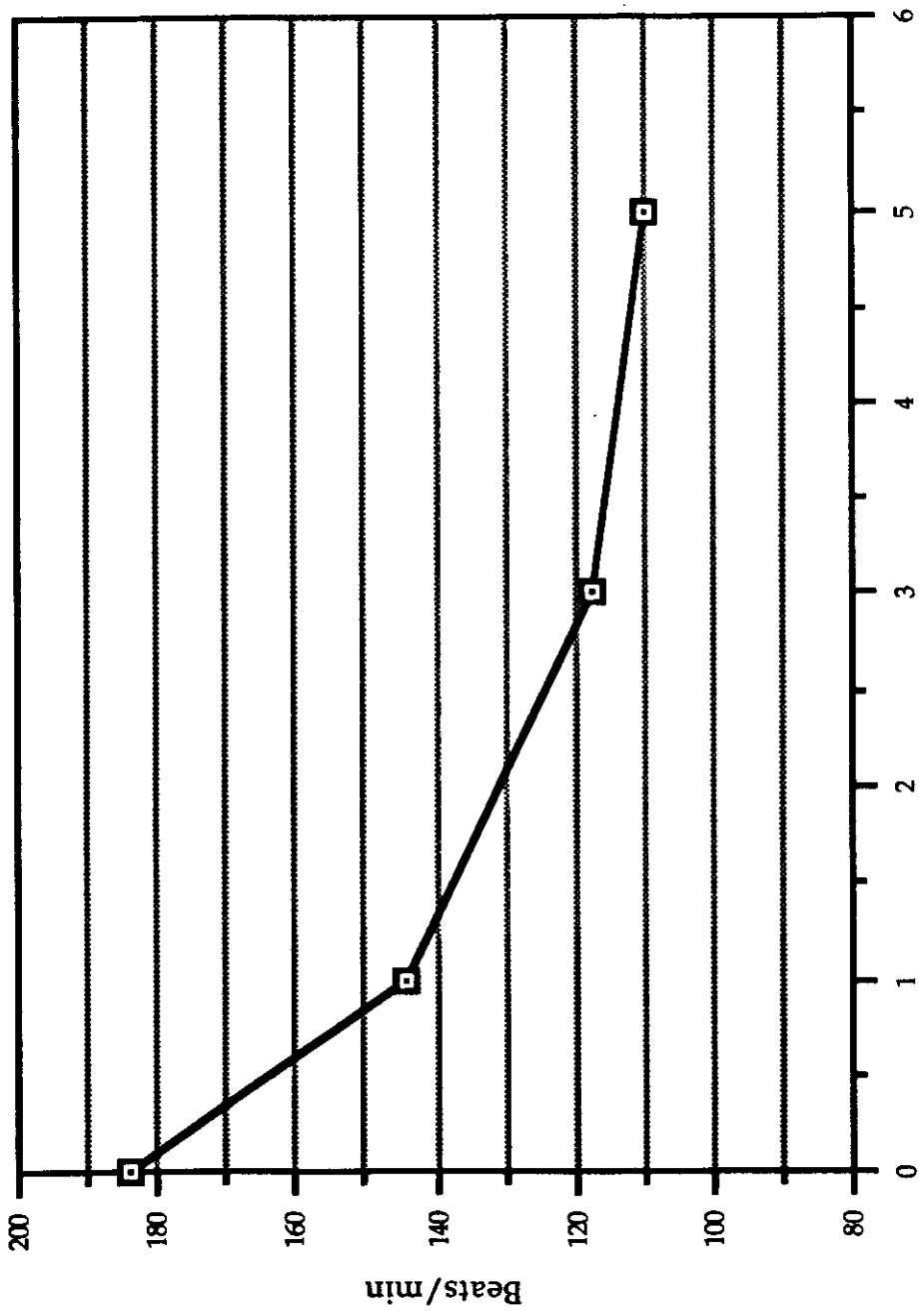

Fig. (22) Recovery heart rate for Taikondo team.

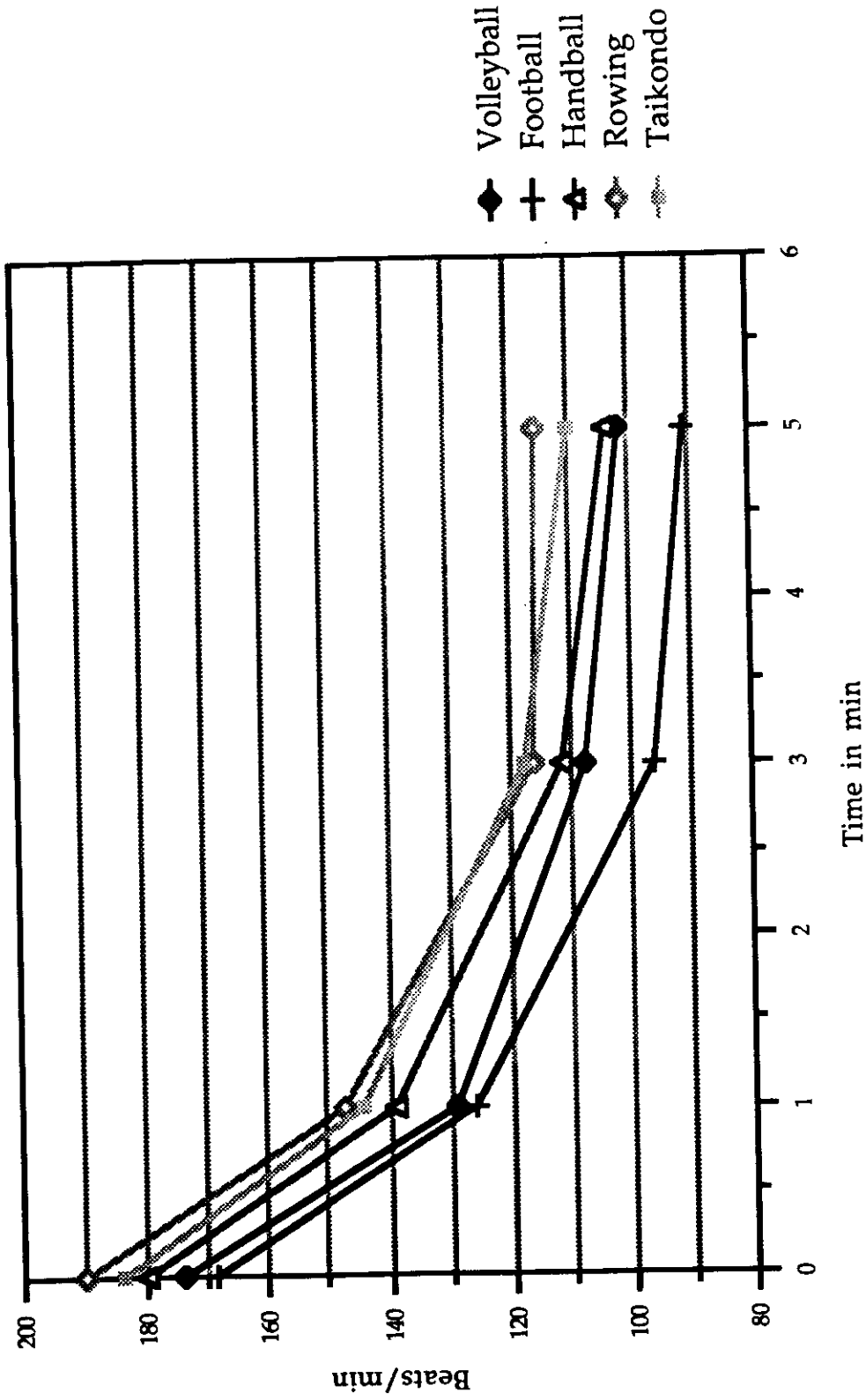

Fig. (23) Recovery heart rate for all teams.

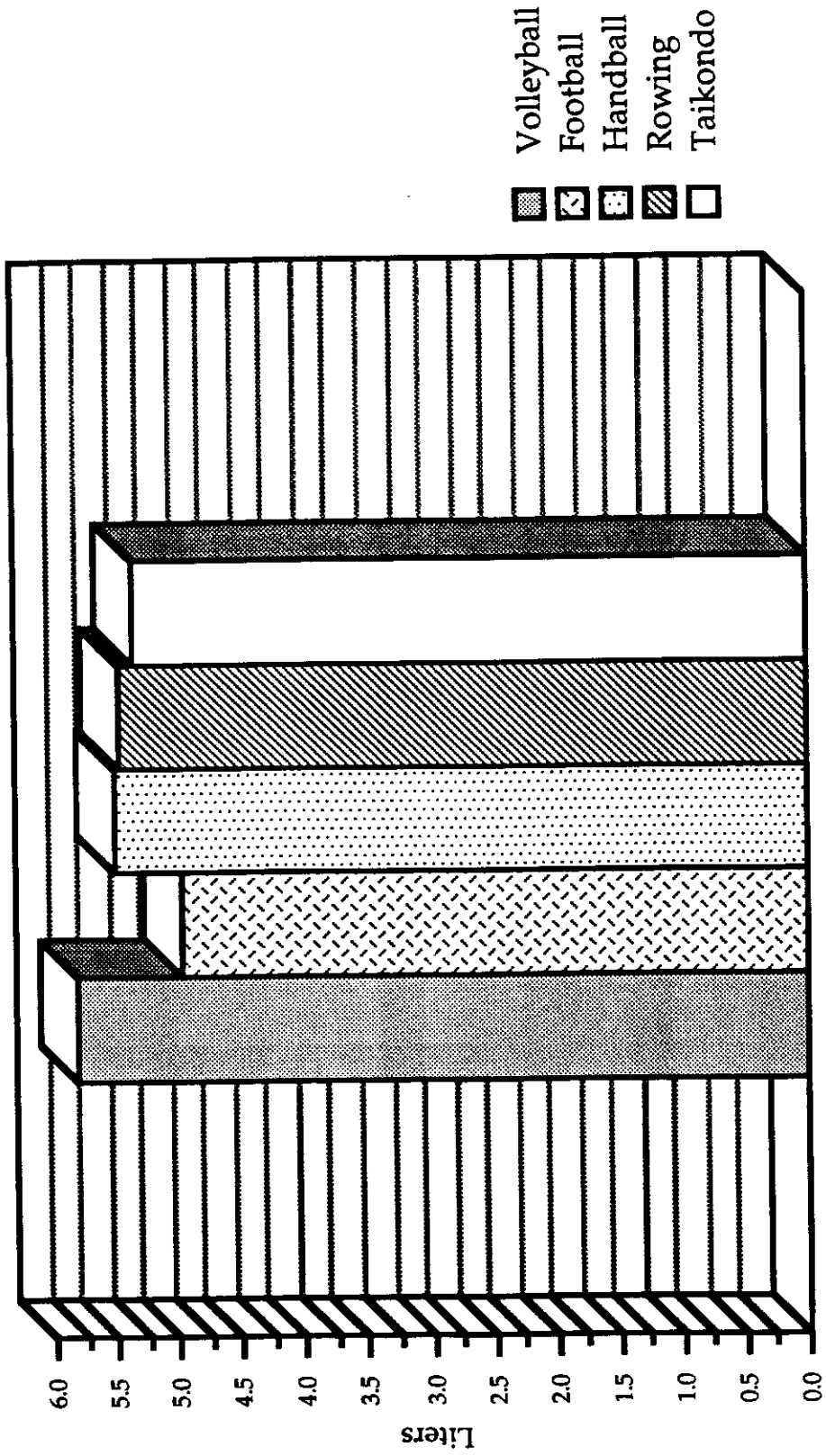

Fig. (24) Vital capacity of the studied groups.

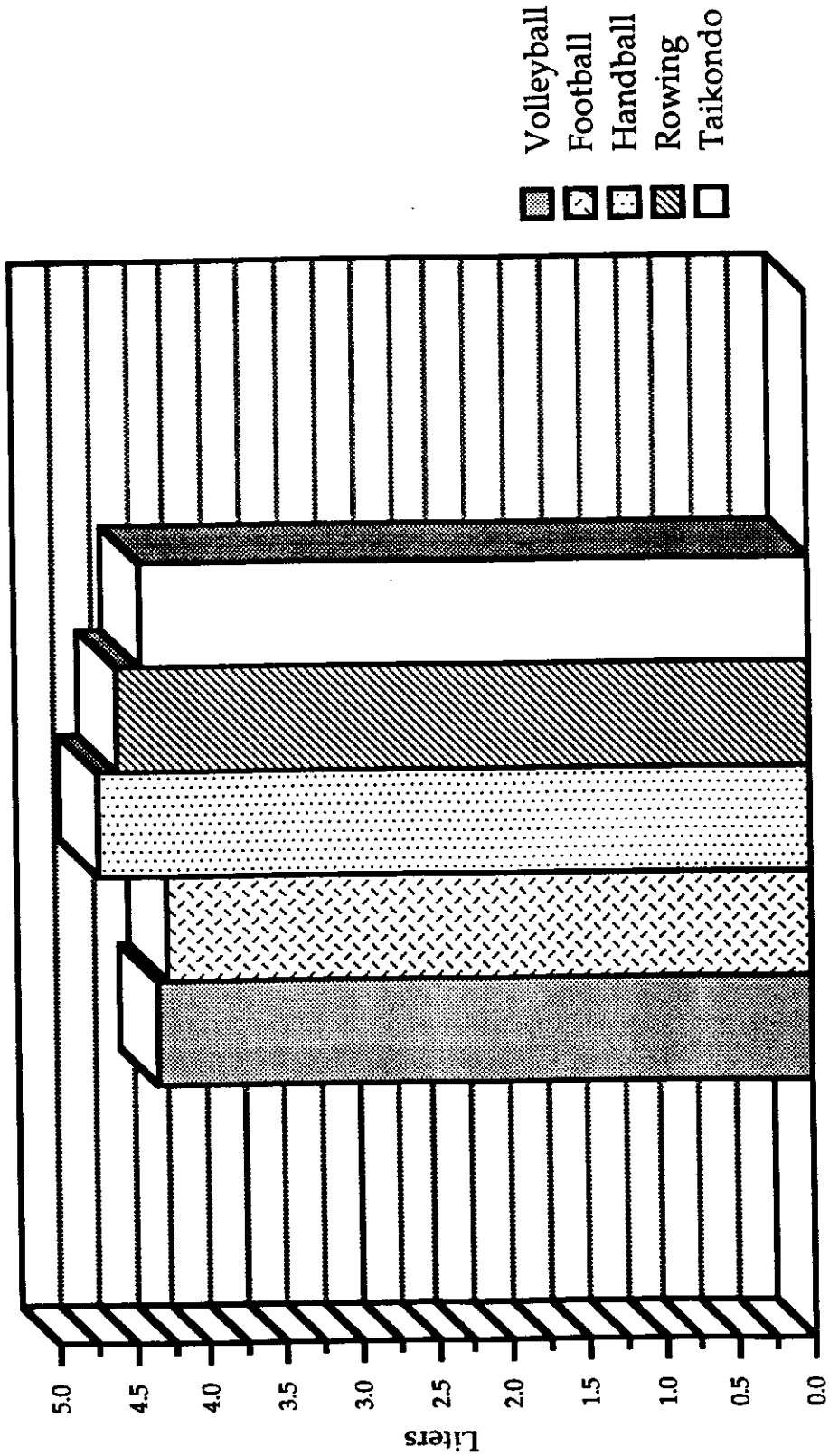

Fig. (25) FEV_1 of all studied groups.

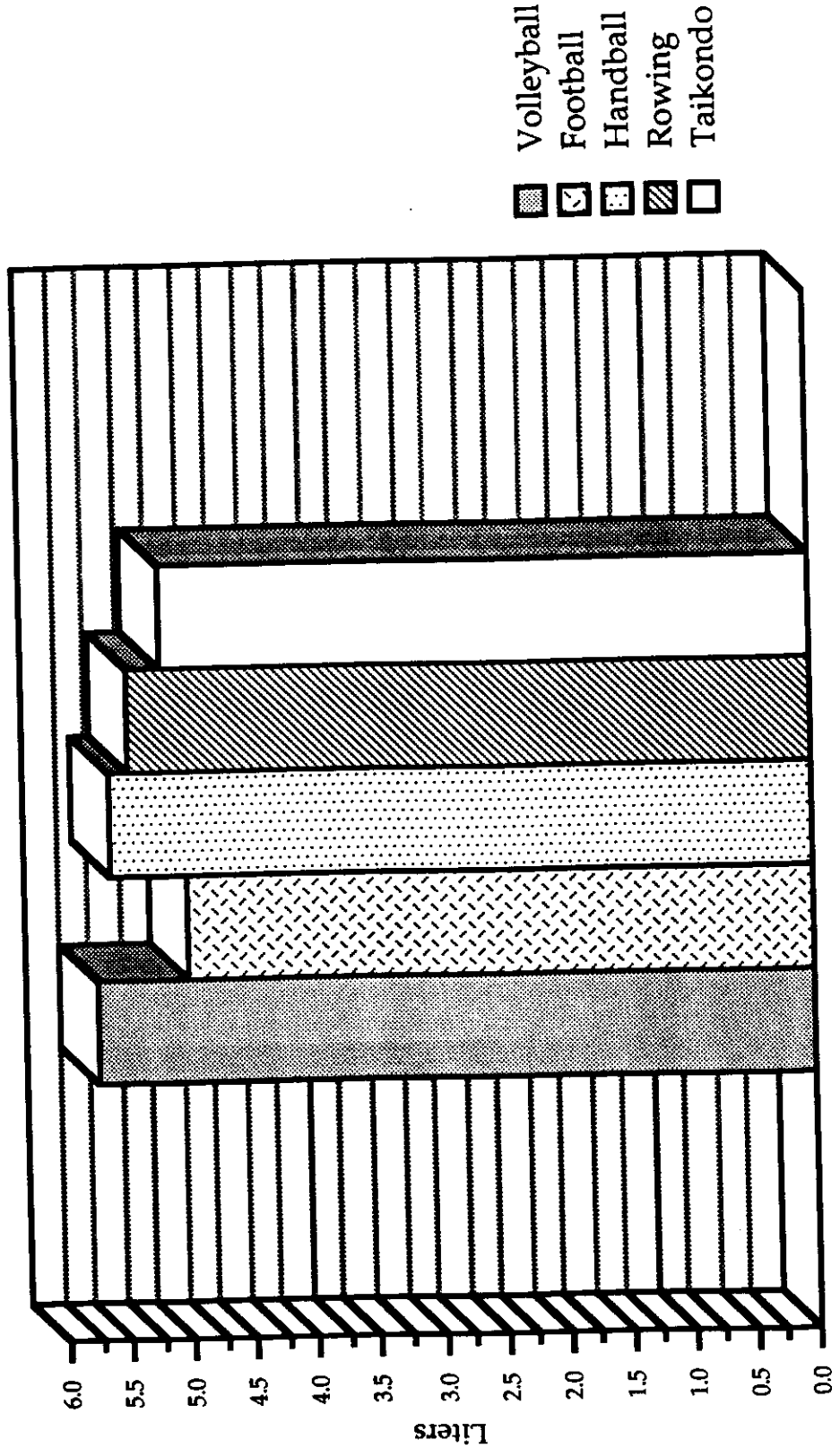

Fig. (26) FVC of all studied groups.

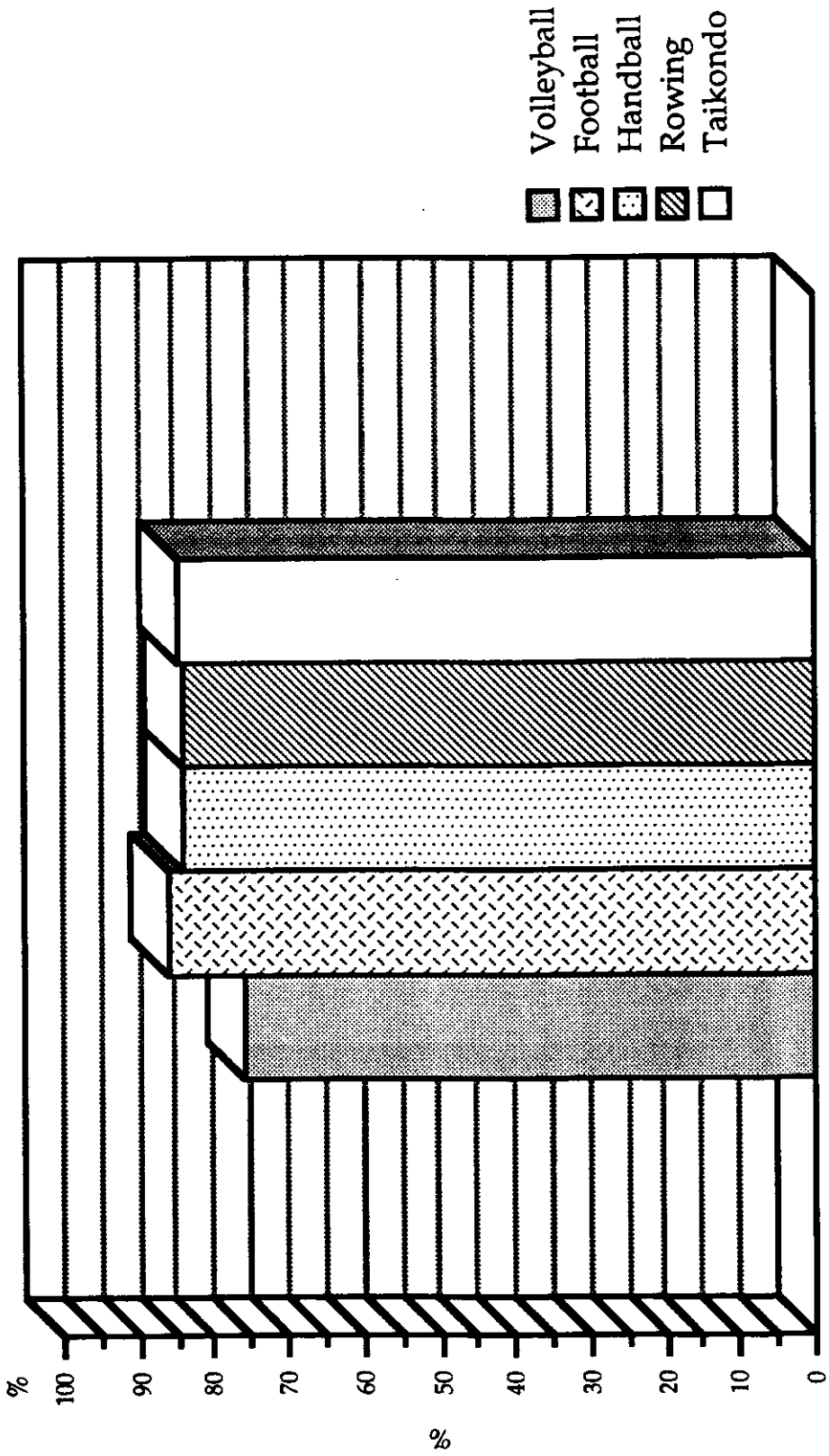

Fig. (27) $FEV_1/FVC\%$ of all studied groups.

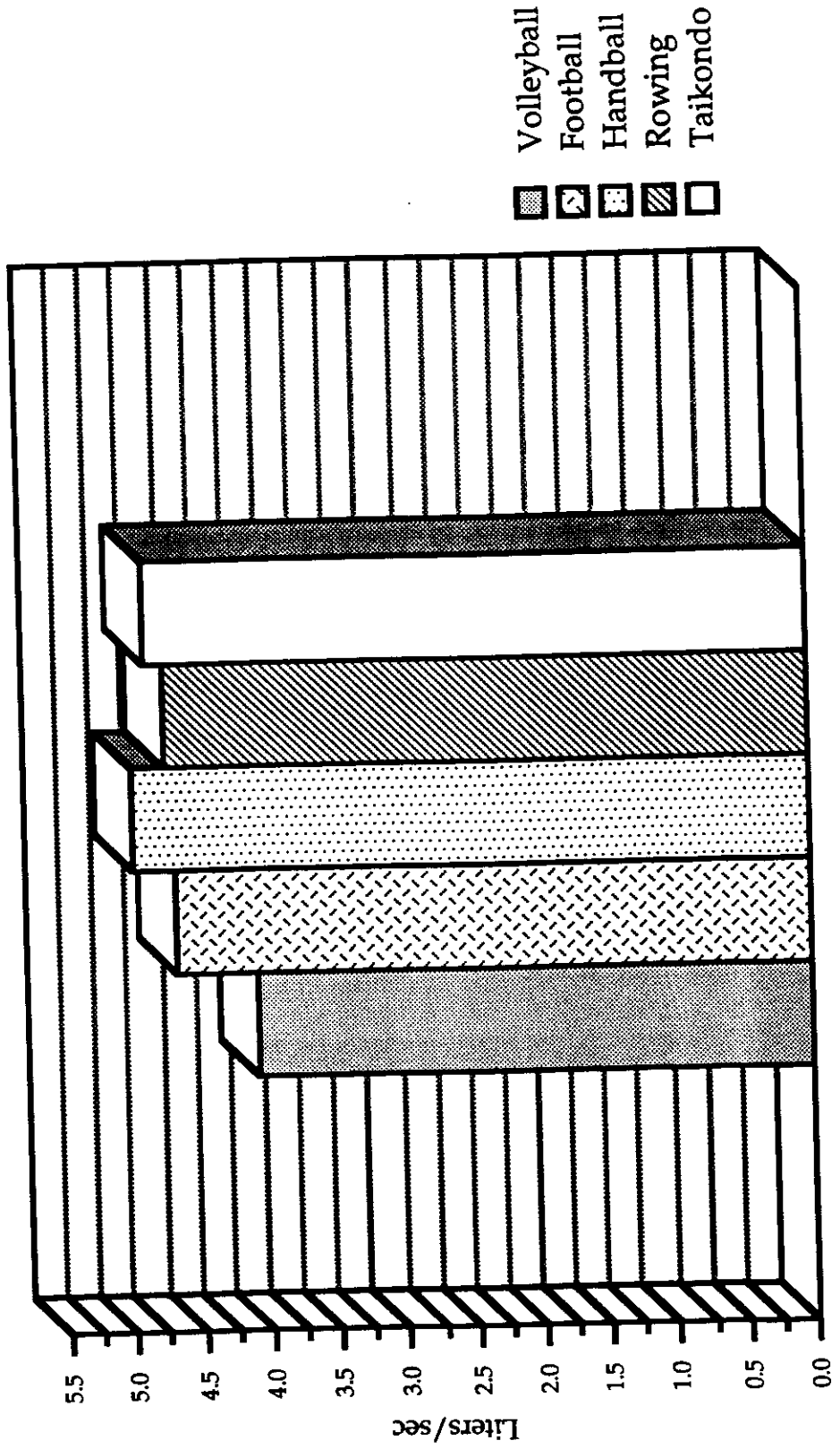

Fig. (28) Forced mid expiratory flow

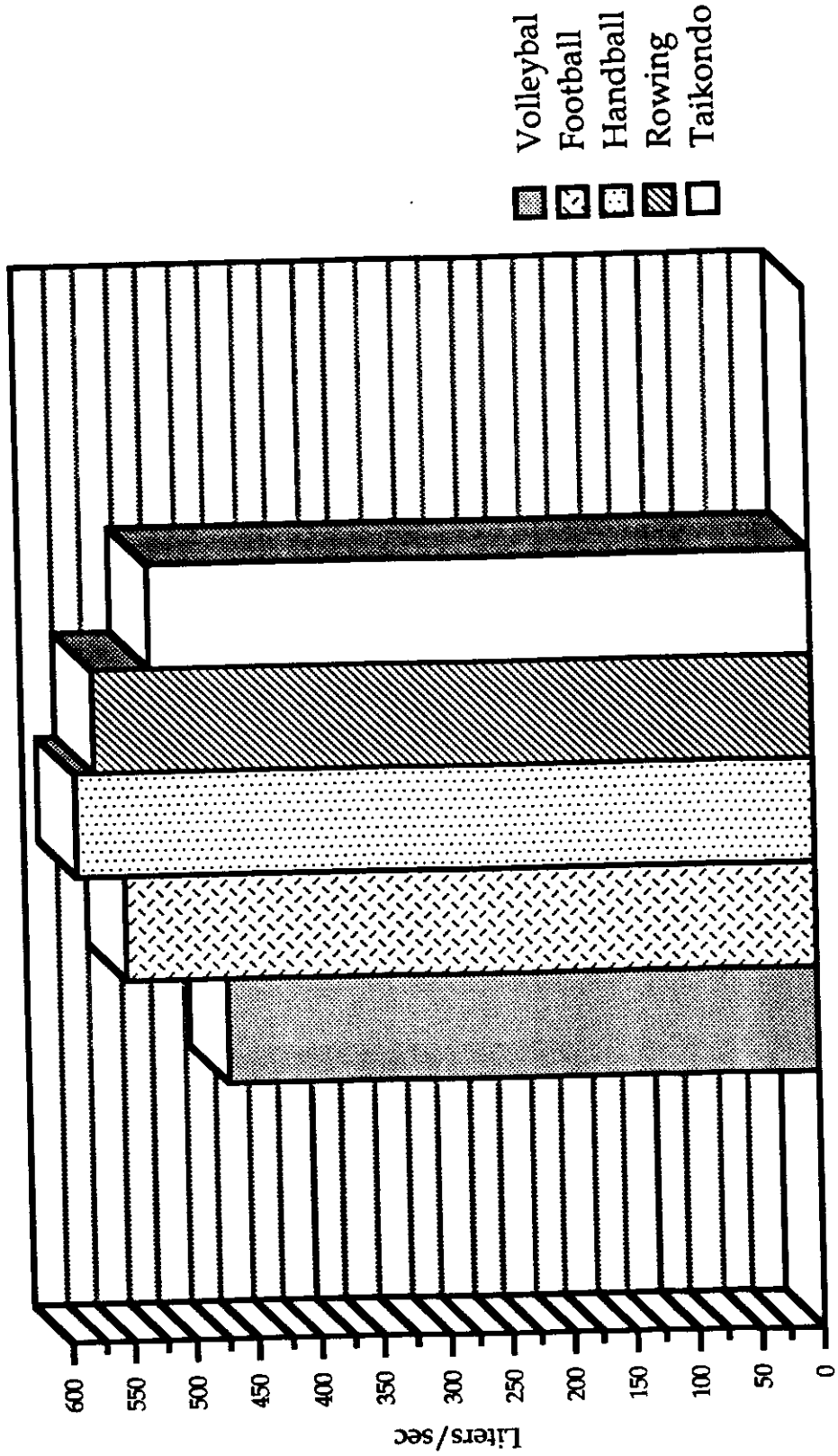

Fig. (29) Peak expiratory flow

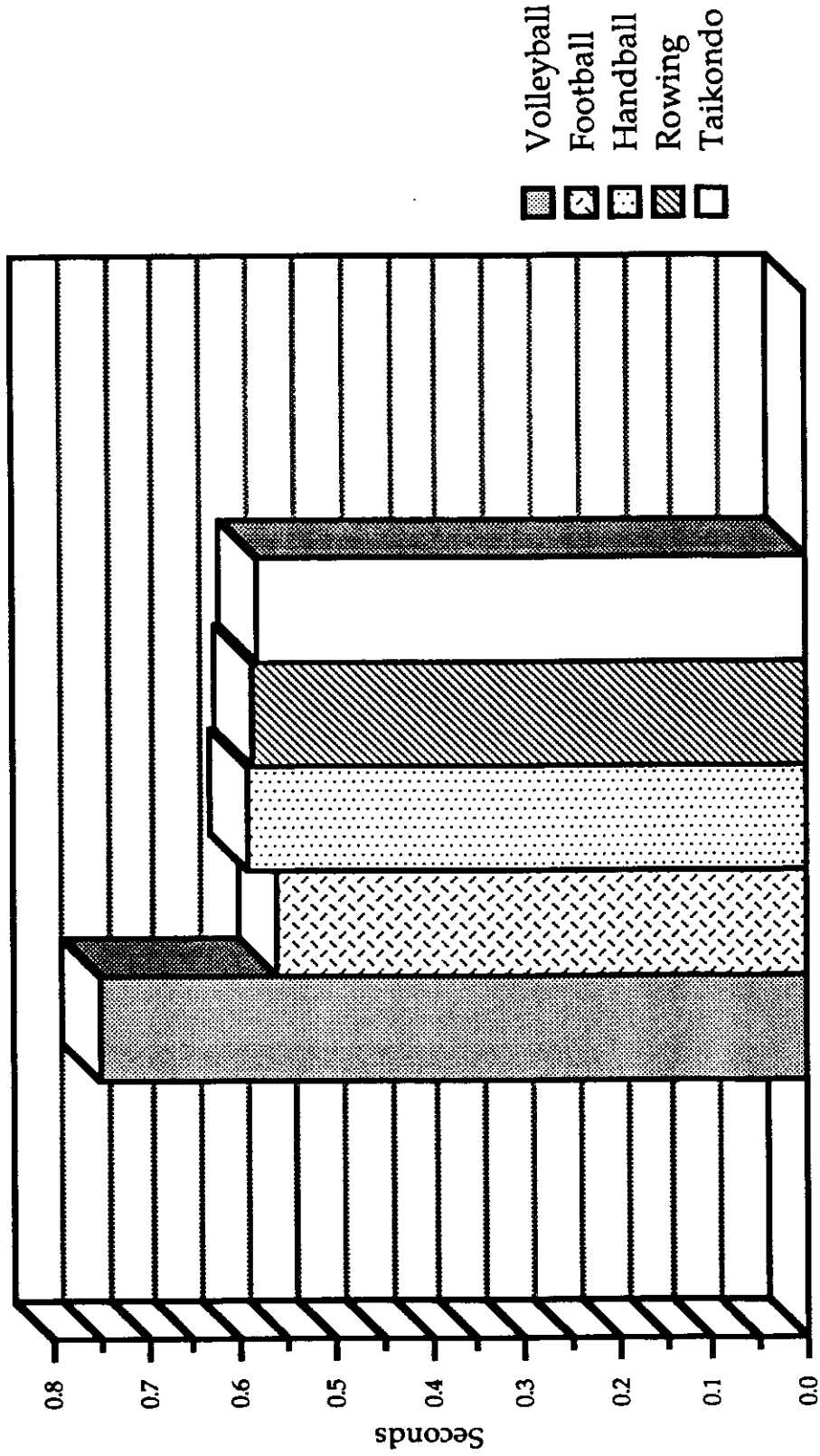

Fig. (30) Forced mid expiratory flow time (FMET)

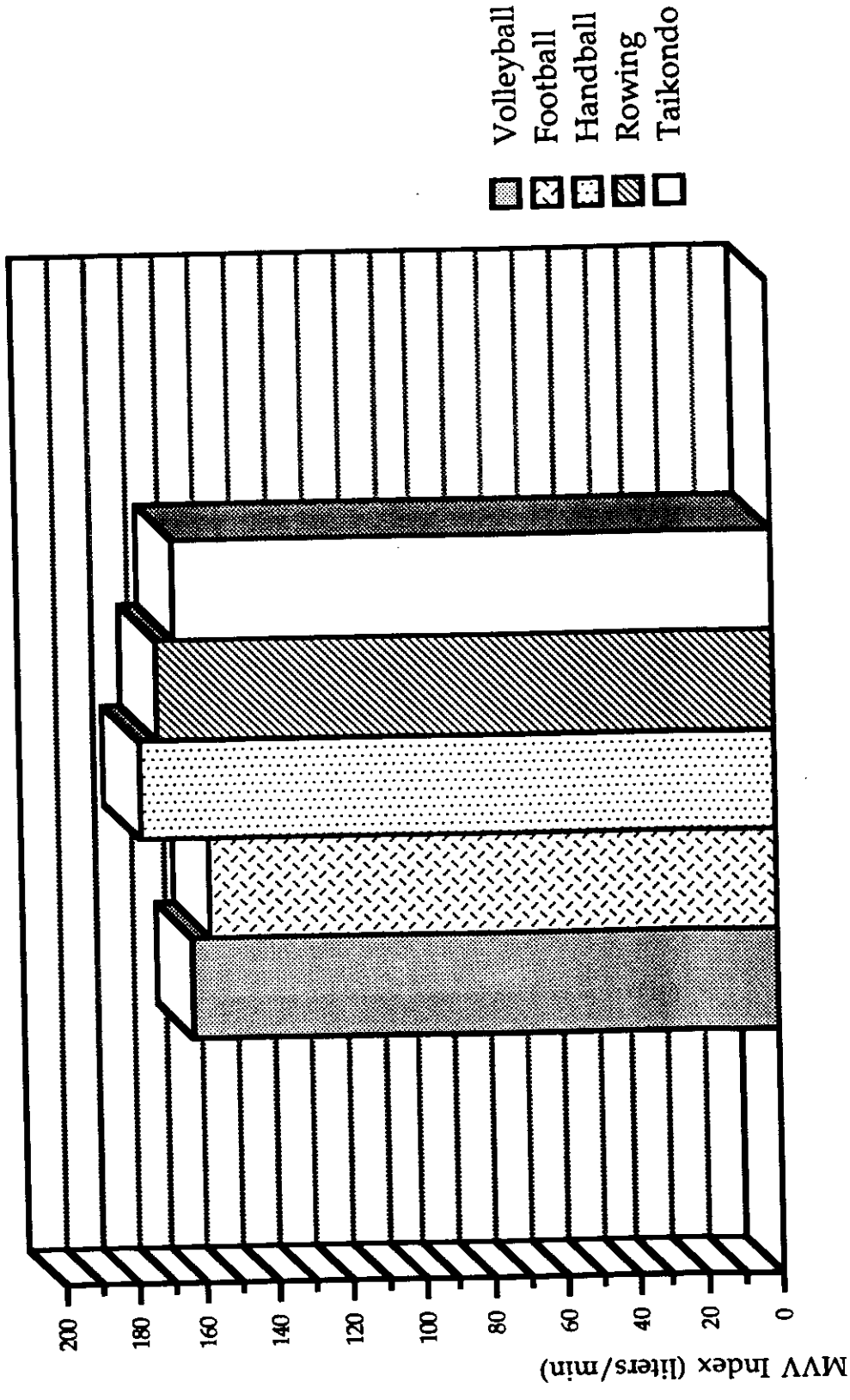

Fig. (31) MVV Index (liters/min) of the studied groups