Chapter - II

REVIEW OF RELATED LITERATURE

This chapter includes a resume of research studies and other literature relevant to the present study.

Choudhary\(^1\) conducted a study on selected physiological variables on eighty inter-college level judokas with the purpose to sketch the profiles and to compare them in different weight categories. The variables selected for the study were resting heart rate, vital capacity, negative breath holding capacity, positive breath holding capacity, and anaerobic capacity. Mean and standard deviations on all the variables for all the weight categories were calculated and ANOVA was used to find out the significant difference in the mean scores. On the basis of results, following conclusions were drawn:

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(1) The training age does not depend upon the weight category. (2) The training programme for the judokas should be according to the body weight category. (3) The training programme for low and middle weight categories should be more strenuous than heavy weight categories. (4) In relation to positive breath holding capacity, no significant difference was found in different weight categories. (5) In relation to the resting heart rate, vital capacity, negative breath holding capacity and anaerobic capacity, significant difference was found in different weight categories.

Mishra\(^2\) conducted a study on twenty National Hockey Academy players to sketch their psychological profiles. The variables selected for this study were incentive motivation (consisting of seven different systems), achievement motivation, state and trait anxiety and sports competition anxiety. The collection of relevant data was based on four test batteries. Mean scores and standard deviation were calculated in order to sketch the psychological profiles of the subjects as a whole. Standardized intervals were designed on the model developed by Watren

et. al. to sketch the individual profiles. With in the limitations of the study, following conclusions were drawn:

(1) Incentive motivation among National Hockey Trainees was fairly high in the systems of excellence, affiliation, sensation, and success. (2) The level of their achievement motivation was just moderate. (3) They were slightly higher on trait and state anxiety as per the norms set by Speilberger et. al. (4) They have a low level of sports competition anxiety.

Carter\(^3\) in his book mentioned that the average judo competitor is of 23.4 years old, 173.1 cms. tall and having a weight of 76.5 kg. has a somatotype of 2.0 - 6, 4-1, 3 (54% endomorphic mesomorphic) and skinfolds totaling 44.1 mm. When compared to other weight classified sports. Judo competitors are most like wrestlers on age and size variables. They are younger and have lesser arm girths than weight lifters. They tend to be more endomesomorphic in upper weight classes compared to lower ones. Their large proportional mass compared to the non-weight classified sports, seems to be accounted for by their high mesomorphy.

The purpose of Claessens and his associates\(^4\) study was to describe the somatic characteristics and the somatotype of 38 world top judoists. The mean age was found to be 25.3 years. It was observed that judoists were broad athletes with high girth values, low amount of subcutaneous fat and a rather “tick-set” stature in relation to their weight. The somatotype profiles is nearly the same to all the weight categories. The somatotypes of the judoists are principally localized in the endomesomorph found as balanced mesomorph and four as ectomesomorph. It was concluded that the somatotype classification of this sample of world class judoists was very homogeneous.

Benny\(^5\) conducted a study of anthropometric measurements and body composition variables on judo players. Nine anthropometric measurements and three body composition variables were taken for this study. Judo players’ ability was taken as the criterion measure and all the variables were taken as the independent variables. Pearson’s Product Moment Correlation was used to find out the relationship between anthropometric measurements and criterion measure.

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A multiple correlation was computed to find out the combined effect of the anthropometric measurements to judo performance. He concluded that:

1. Performance in judo is positively and significantly related to chest girth.

2. Judo performance is negatively and significantly related to pondral index which means that for better judo performance judoka should possess greater body weight in proportion to body height.

3. Lean body mass, upper arm/force arm ratio and sitting height are the most important predicting variables under the limitation of this study.

Ikai, Fukunaga and Toheda\(^6\) studied body composition of judokists of age varying from 18 to 21. The following results were obtained.

1) The cross-sectional area of the upper and forearm was photographed by means of ultrasonic radiation.

2) The maximum muscle strength of the arm flexor was observed about 26 percent higher in judosists. No significant difference was observed in strength per unit cross-sectional area of the arm flexor between both groups: $6.4 \pm 1.1 \, \text{kg./cm}^2$ in non-trainees. The strength per unit cross-sectional area of these judosists could be improved by 30 percent through intensive strength training.

3) The total mass of body fat, solid and body water was about 18 percent higher in judosists. No significant difference were observed in the ratio of body compartment between both groups.

Khanna et al.\textsuperscript{7} study consisted of seven judo players and fourteen normal subjects of sedentary habits. On the first day their anthropometric characteristics including body fat percentage, grip strength and anaerobic power were measured. On the second day their maximum aerobic power was determined. Body fat percentage was determined by measuring the skinfold thickness over 4 different

sites, namely biceps, triceps, suprailliac and subscapular regions with skinfold caliper.

Mean age, height and weight of the judo players did not differ much from the normal sedentary group, even the judosists did not differ among themselves (6.10 - 64.6 kg) and they formed a single weight category, mean body fat percentage (12.5%) of the judo players was significantly lower than that of the sedentary persons (P < 0.05). This signifies that this athletic group has a higher mean lean body mass than that of the normal group. Average fat percentage of the judosists studied, was also comparable to the Canadian Judo Team (Tayler and Brasord 1981). However, the fat percentage of the judosists of the present investigation and also of the Canadian Team were higher than the reported value of the trained weight categorised athletes (Wilmore 1970).

Australian’s best male judo players were tested in laboratory, on the mat, and in the weight room by Tumilty et al.8 The players were divided into junior and senior groups on the basis of ability as assessed by the coach. There were no

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differences between the two groups (at .05 level of significance) on tests of body fat, maximum oxygen uptake etc.

The chief coach separated the players into two groups on the basis of ability, the division coinciding also with age, the less able junior group being under 20 years. Statistical comparison of the heights and weight were not useful as the players within the two groups were distributed differently in the weight classes. There was no significant difference between the means of the groups on skinfolds. Since the range of values was wide 41.8 to 12.06 mm. for the juniors and 39.4 to 95.2 mm. for the seniors. The figure suggest that a number of players, especially juniors, were over fat, since the means of many groups of athletics at the Australian institute of sport is under 60 mm. with many individuals lying between 35 and 45 mm. (Telfer, 1984). The penalties of excess fat can include having to compete in too high a weight class, reduced power to weight ratio with concomitant reduction to diet and an appropriate training volume are necessary to, overcome the problem.
Callister et al.\textsuperscript{9} studied eighteen male and nine female nationally ranked judo athletes to construct profiles that would provide some understanding of the physiological capacities underlying successful judo performance. Body composition, aerobic capacity, idokinetic elbow and knee flexion and extensor strength, and muscle fiber size and composition of the vastus lateralis were examined. Higher ranked males (except heavy weight) differed from lower ranked males in percentage of body fat $5.1 \pm 0.6$ Vs $8.2 \pm 0.8$ \( P < 0.05 \). While more successful females tended to have greater upper body strength than less successful females. More striking, however, was that the characteristics examined varied ( \( P < 0.05 \)) as a function of weight division for both male and female athletes. A weight division increased, percentage of body fat increased ( \( r = 0.64, 0.72 \)). Among females in particular athletes in the higher weight divisions were stronger relatively to LBM than those in the lower divisions.

Mitsutsugu et al.\textsuperscript{10} studied the influence of the juvenescence judo practice on their bodies ( \( N = 33 \)). The subjects were grouped into judōsists, soccer


players, basketball players of each 5th and 6th graders and 7th and 8th graders. The number of subjects of each group was 10 to 12 in each sports events and grade. 14 anthropometric measurements were taken. He found that the percentage of body fat of the judo group was larger than that of other groups and it was much larger in junior high school students. He also concluded that the physique of judo group consisting 5th, 6th, 7th and 8th grades were for above the national average.

Thomson\textsuperscript{11} compared body composition and physical dimensions in young, experienced wrestlers \((W > \times \text{age} \pm 8E = 11.1 \pm 0.24 \text{years}, \ N = 237\). They were the best wrestlers from local wrestling clubs and averaged \((\pm \text{SE})\ 2.7 (\pm 0.27)\) years in experience. They had won 72\% (1.8\%) of the total 75 (\pm 9.1) matches. Additionally more than half were the top 3 places in city and or statements and 6 had won an international meet. The 3 were from local elementary schools and were considered typical in the variables measured to similar group of children from the literature standards densitometric and anthropometric techniques were used to measure the body composition (percent fat from six formula) and physical dimensions of each group. Residual lung volume was determined by the oxygens

dilution technique. The W were U Kg. (± 1.9) lighter (P 0.05) and had a smaller percent of body fat than S (W, x ± SE = 13.3 ± 0.66% and S, x ± SE = 20.0 ± 1.13% P 0.05). The percent body fat of W was more than 2 x maximal value proposed by the American College of Sports Medicine for high school and college wrestlers. The lower fat of W was reflected in smaller skinfolds (leg transformation) and lower body of circumferences, height or lean weight. It was concluded that wrestlers had lower body fat but similar skeletal structure when compared with typical children. The data suggest for a need for separate standards for minimal wrestling weights of young children.

Sady et al.\textsuperscript{12} compared the body composition and physical dimensions of 23 young experienced wrestlers with 23 school children. Standard densitometric and anthropometric techniques were used to measure the body composition and physical dimensions of each group. The wrestlers were 4 kg. lighter (P 0.05) and had a smaller percent fat than the comparison group (13.3 ± 0.66% and 20.0 ± 1.13%, respectively). The weight differences between groups were due to the larger fat weight of the comparison group since lean weight differed by only 0.8

kg. Fat differences were also reflected in the larger skinfolds and fat circumferences of the composition group. No group differences were noted in diameters. It was concluded that compared to other children, young experienced wrestlers had similar skeletal structures and lean body weight. The comparison group possessed more body fat.

Thomson et al.\textsuperscript{13} compared the body composition and physical dimensions in young and experienced wrestlers. The best wrestlers (W) were 4 kg. (t 1.9) lighter (P 0.05) and had a smaller percentage of fat than local elementary school children. The percentage of body fat of W is more than 2 x the minimal value proposed by the American College of Sports Medicine for high school and college wrestlers. The lower fat of W was reflected in smaller skinfolds and lower - body circumferences, height or lean body weight. It was concluded that wrestlers have lower body fat but similar skeletal structure when compared with typical children. The data suggest a need for separate standards for minimal wrestling weights of young children.

The purpose of Housh and associates\textsuperscript{14} study was to determine the validity of 23 anthropometric equation for estimating body composition and minimal wrestling weight in high school wrestlers. A total of 409 high school wrestlers (M. age ± S.D. = 16.42 ± 1.03 years) volunteered for this study. Twenty three anthropometric measures including eight skinfolds, nine circumferences and six diameters were obtained from each subject. The mean body density, determined from underwater weighing, was 1.0748 ± 0.0100 gcm\(^{-3}\). The cross validation analysis indicated that the quadratic skinfold equation of Lohman resulted in the most accurate estimation of body density. The total error, constant error, standard error of estimate, and \textquoteleft r\textquoteright for this equation were 0.0077 gcm\(^{-3}\), - 0.0003 gcm\(^{-3}\), 0.0076 gcm\(^{-3}\) and 0.65 respectively. Further more, the results of this investigation indicated that the minimal correlating weight equation of Tcheng and Tipton resulted in total error values (5.54 to 6.06 kg.) which were too large to be of practical use for high school wrestlers.

\textsuperscript{14} Terry J. Housh et al., "Validity of Anthropometric Estimations of Body Composition in High School Wrestlers," \textit{Research Quarterly} 60 (September 1989): 239.
Singh\textsuperscript{15} conducted a study on fifteen pace academy cricket players to investigate their psychological profiles. The variables selected for this study were incentive motivation (consisting of seven different system i.e. excellence, power, sensation, independence, prestige, affiliation and aggression), achievement motivation, state and trait anxiety and sports competition anxiety. The collection of relevant data was based on four test batteries i.e. Alberta Incentive Motivation Inventory, the Sports Achievement Motivation Test, State and Trait Anxiety Inventory (STAI) and Sport Competition Anxiety Test. Mean scores and standard deviations were calculated in order to study the psychological profiles of the subjects as a whole. Standardized intervals was designed on the model developed by the Watson et al. to sketch the individual profiles. Within the limitations of the present study following conclusions were drawn - (1) Incentive Motivation among pace academy Cricketers was fairly high in the systems of excellence, affiliation, sensation and success, (2) The level of achievement motivation of the pace academy Cricketers was just moderate, (3) Pace academy cricketers were slightly higher on trait anxiety and moderate in state anxiety, (4) They had low level of sport competition anxiety.

\textsuperscript{15} Mahendra K. Singh, "Psychological Profiles of Pace Academy Cricket Players," (Unpublished M.Phil Dissertation, Jiwaji University, 1993).
Patial\textsuperscript{16} conducted a study to study the selected psychological variables of female hockey players of India with the purpose to sketch a profile of national hockey players, to compare the status of national and inter-national and finally to draw the individual profiles for international players who have represented the country in the recent most international tournaments. The variables selected for the study were incentive motivation (consisting of seven different systems), achievement motivation, state and trait anxiety, sport competition anxiety and extraversion-intraversion and neurotism. For the collection of data, Alberta Incentive Motivation Inventory, the Sports Achievement Motivation Test, State and Trait Anxiety Inventory (STAI). Sport Competition Anxiety Test and Eyseneck Personality Inventory were administered during 23rd Senior National Hockey Championship. Mean and SD on all the variables for both the groups were calculated and ‘t’ test was used to find the significance difference in the mean scores. The group and individual profiles were sketched on the model developed by Watson et al. On the basis of results, following conclusions were drawn:

1. National and International female hockey players of India have a moderate motivational profile.

2. The level of their achievement motivation is just moderate.

3. Both are beset with high trait and state anxiety.

4. Low competition anxiety is perhaps, a great asset with both of them.

5. International players were found to be stable introverts whereas national players had leaning towards ambiversion and neurotism.

Kumari and Kamlesh\textsuperscript{17} investigated the level of state and trait anxiety of track and field male athletes (\( N = 21 \)) and boxers (\( N = 21 \)) by administering to them the state and trait anxiety inventory (self evaluation questionnaire) by track and field athletes and boxers exhibited a higher level of state as well as trait anxiety.

Fig. 8: Means of senior and junior judo players in relation to resting respiratory rate.
Sharma\textsuperscript{20} administered 16 PF to 100 male and 100 female players. The results revealed that except one factor H i.e. Shy Vs Venturesome, in personality make-up, the two samples are not different.

Singh\textsuperscript{21} compared sixty-four male and sixty female players who participated in the national games. Out of which twenty-four champion and twenty-four non-champion players and eighteen champion and eighteen non-champion female judo players were administered Rainer Martin’s SCAT (A) for adults. It was concluded that male judo players of national level were low in sports competition anxiety than their non-champion counter parts. Champion and non-champion female judo players did not differ on sport competition anxiety level.

Sinha\textsuperscript{22} conducted a study on fifty successful and fifty un-successful athletes. TAT measure as prepared by McClelland was used to measure level of


\textsuperscript{22} S.P. Sinha, “Need Achievement, Locus of Control and Task Persistence as Related to Athletic Success,” Research Bi-annual Movement, Sports Psychology Special 5\textsuperscript{2} (1987): 18-25.
need achievement. The results of the present study showed that successful athletes scored higher than their unsuccessful counterparts.

Singh\textsuperscript{23} administered SCAT (Marten's) to Indian athletes and hockey players and found significant differences between the two samples on sports competition anxiety. Hockey players, both male and female, were found to have less competition anxiety as compared to the players of individual events. Males exhibited less anxiety in competitive situations as compared to the females.

Datta\textsuperscript{24} conducted a study on 74 male hockey players in the age group of 18 to 24 years studying in different Indian Universities. He administered IPAT Anxiety Scale to the subjects and come to the conclusion that low level of anxiety contributes to superior performance in hockey.


Fig. 11: Means of senior and junior judo players in relation to lean body weight.
Morgen and Pollock\textsuperscript{27} reported that elite marathon runners possessed unique psychological characteristics that differentiate them from the normal population. Their findings are based primarily on the profile of Mood States (POMS), which consist of six factors: tension, depression, anger, vigour, fatigue and confusion. The researchers found that elite runners scored higher than college norms on the POMS vigour factor in contrast to the other five mood states, which fell below college norms.

Alderman and Wood\textsuperscript{28} conducted one of the first investigations designed to assess the motives for participation. 425 Canadian male Ice-hockey players ages 11 to 14, completed a survey which assessed seven incentive motives for participating in hockey. These included independence, power, affiliation, arousal, esteem, excellence and aggression incentives. The results revealed that affiliations was found to be the strongest motive expressed by the athletes. Next in order were excellence, stress and success rated as the most important incentives by the players with independence and power incentives being rated as least important. In a


subsequent investigation of several thousand young athletes age 11 to 18, Alderman has reported that the order of these motivational systems remained consistent when his inventory was employed on several thousand Canadian athletes.

Klavora\textsuperscript{29} using Spielberger State Trait Anxiety Inventory with 300 high school basketball and football players tried to determine if competition causes changes in A-state. The state scale was administered in a practice session at least one week prior to a game, half hour before a regular season game, and again half hour before a tournament play off game. The results showed that high A-state players in both samples were higher in A-state for all three A-state measures. Both the high and low A-trait groups showed substantial increase in A-state just prior to both contests when compared to the practice A-state level. No difference was found between the regular season game and play-off game.

Gorsuch\textsuperscript{30} conducted a study on thirty non-athletes, thirty team sport athletes and thirty individual sport athletes to determine their level of achievement motivation and administered to them McCelland’s Thematic Apperception Test. Results of the study indicated to significant differences among the achievement response scores of the three groups or among the n-achievement score of the ten athletic sub-groups.

Morgan\textsuperscript{31} conducted a study on wrestlers and found that world class wrestlers scored lower than the population mean on a standard measure of neurotism.

James\textsuperscript{32} conducted a study on the effect of anxiety and need for achievement on the performance of high school wrestlers. Data was obtained from the thematic appreception test, the test anxiety questionnaire exceptancy ratings by 


\textsuperscript{32} Earl R. James, "The Effect of Emotional Stress Upon Motor Performance of Anxious and Non-Anxious Subjects,"\textit{ Completed Research in Health, Physical Education and Recreation} 8 (1966) : 44.
individuals and by their coaches. Performance data was obtained from match score books and observations. It was concluded that the personality traits at anxiety and need for achievement both the expectancy and the actual performances of these IIS wrestlers. Subjects who measured low in anxiety performed better than those high in anxiety. The groups scoring highest in performance was that of low anxiety and high need for achievement. The lowest level of performance was demonstrated by the group high in anxiety and low in need for achievement.

Johnson, Hilton and Johnson\textsuperscript{33} found champion athletes having a strong need to achieve as compared to other athletes.